LevelPRO

Continuous Gamma Level System
Installation Guide
P/N 717760

Revision H

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

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Installation Guide
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Revision History

Revision Level	Date	Comments
1.0	03-1999	Initial release.
2.0	08-2001	Revised per ECO 7570.
A	02-2006	Revised per ECO 5101.
B	10-2007	Revised per ECO 6000.
C	08-2008	Revised per ECO 6540.
D	06-2009	Revised per ECO 6940.
E	04-2010	Revised per ECO 7323.
F	07-2010	Revised per ECO 7430.
G	09-2010	Revised per ECO 7508.
H	12-2011	Revised per ECO 7875.

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Safety Information & Guidelines

This section contains information that must be read and understood by all persons installing, using, or maintaining this equipment.

Safety Considerations

Failure to follow appropriate safety procedures or inappropriate use of the equipment described in this manual can lead to equipment damage or injury to personnel.

Any person working with or on the equipment described in this manual is required to evaluate all functions and operations for potential safety hazards before commencing work. Appropriate precautions must be taken as necessary to prevent potential damage to equipment or injury to personnel.

The information in this manual is designed to aid personnel to correctly and safely install, operate, and / or maintain the system described; however, personnel are still responsible for considering all actions and procedures for potential hazards or conditions that may not have been anticipated in the written procedures. **If a procedure cannot be performed safely, it must not be performed until appropriate actions can be taken to ensure the safety of the equipment and personnel.** The procedures in this manual are not designed to replace or supersede required or common sense safety practices. All safety warnings listed in any documentation applicable to equipment and parts used in or with the system described in this manual must be read and understood prior to working on or with any part of the system.

Failure to correctly perform the instructions and procedures in this manual or other documents pertaining to this system can result in equipment malfunction, equipment damage, and / or injury to personnel.

Warnings, Cautions, & Notes

Warnings, cautions, and notes are used throughout this manual to alert users to potential hazards or important information. **Failure to heed the warnings and cautions in this manual can lead to injury or equipment damage.**

Warning Warnings notify users of procedures, practices, conditions, etc. which may result in injury or death if not carefully observed or followed. The triangular icon displayed with a warning varies depending on the type of hazard (general, electrical, radiation). ▲

Caution Cautions notify users of operating procedures, practices, conditions, etc. which may result in equipment damage if not carefully observed or followed. ▲

Note Notes emphasize important or essential information or a statement of company policy regarding an operating procedure, practice, condition, etc. ▲

Chapter 1
Product Overview

Refer to the LevelPRO user guide for descriptions of instrument functions and features.

Required Documentation

In addition to this guide, the following documents must be read and understood by all persons installing, using, or maintaining this equipment:

- LevelPRO user guide, p/n 717778
- LevelPRO HART operation guide, p/n 717817 (if using HART)
- Model 9734 HHT user guide, p/n 717797 (if using the HHT)
- Gamma Radiation Safety Guide, p/n 717904
- LevelPRO with FOUNDATION™ Fieldbus Application Guide, p/n 717915 (if FOUNDATION fieldbus option is installed)

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Chapter 2
Handling & Storage

This chapter addresses procedures for handling electrostatic discharge (ESD) sensitive equipment, as well as procedures for unpacking, inspecting, and storing of the system.

Caution This system is an ESD sensitive instrument. Use proper ESD protective equipment and procedures. Failure to comply with ESD procedures can result in circuit damage. ▲

ESD Procedures

The instrument contains electronic components that can be damaged from discharges of static electricity: **Do not** touch the circuit board components. Ordinarily, handling the circuit boards by their edges will not damage the circuits.

Observe the following when installing, setting up, servicing, troubleshooting, or repairing the instrument:

1. Use an antistatic bag. Most instrument subassemblies are shipped in a special antistatic bag. When not installed, keep the assembly in the bag as often as possible.

2. Remove ESD sensitive subassemblies only under the following conditions:
   a. When at a designated static-free workstation or when the bag is grounded at a field site.
   b. After the conductive area of the container has been neutralized.
   c. After making firm contact with an antistatic mat and / or firmly gripping a grounded individual.

3. Personnel handling ESD sensitive devices should be neutralized to a static-free workstation by means of a grounding wrist strap that is connected to the station or to a good grounding point at the field site.

4. Do not allow clothing to make contact with ESD sensitive devices.

5. Avoid touching edge connectors and components.

6. Avoid partially connecting ESD sensitive devices. These devices, especially the power supply connector, can be damaged by floating leads.

7. Ground test equipment.

8. Avoid static charges during troubleshooting.

Unpacking, Inspection, & Storage

Note Inspection, adjustment, installation, and maintenance of the instrument must be performed by experienced personnel only. ▲

1. Upon receipt, inspect the instrument for damage that may have occurred while in transit. If there is evidence of rough handling or damage, file a damage claim with the transportation company immediately. Notify Thermo Fisher Scientific and / or your sales representative as soon as possible.

2. Carefully inspect the packing material prior to discarding it to ensure that all equipment and instruction paperwork has been removed.

3. Use the original packing material and container for storage if necessary.

4. If storing the instrument, the storage environment should be protected, free from extremes of temperatures and high humidity, and fall within the environmental constraints listed in the specifications.

Packing, Shipping, Transporting, & Receiving

All personnel involved in the packing, shipping, or receiving of hazardous material must be trained in accordance with the United States Department of Transportation (DOT) and OSHA hazardous materials regulations or in accordance with the Canadian Nuclear Safety Commission (CNSC) regulations.

Chapter 3
Hardware Installation

Read the Gamma Radiation Safety Guide (p/n 717904) PRIOR TO installing the equipment.

Note Copies of the drawings referenced in this manual are provided in Appendix C. ▲

For detector-transmitter housing layout details, refer to drawing 868502. For mounting dimensions, refer to drawing 868672 or 868674 for water-cooled units.

A variety of source housings are used with the scintillation detector depending on the requirements of the application. Refer to the appropriate drawing for your source.

Licensing

Warning The instrument is a nuclear device regulated by federal and / or state authorities. You are responsible for knowing and following the pertinent safety and regulatory requirements. Refer to the Gamma Radiation Safety Guide (p/n 717904) for a summary of these requirements. ▲

Warning Moving or removing an installed source housing or any assembly that includes a source housing requires a person who is specifically licensed to install and commission Thermo Scientific source housings. ▲

In the United States, your general license permits you to own and install all of the instrument's components, including the source housing. However, you may not commission the instrument (remove the lock and open the source housing shutter for the first time) without a specific license authorizing radiation commissioning of the instrument. In Canada, you are only allowed to remove the instrument from the shipping container if your CNSC license has a condition authorizing mounting / dismounting of devices. For assistance obtaining a license and / or commissioning / decommissioning the instrument, contact Thermo Fisher Scientific.

Source-Detector Configurations

The gauge is comprised of a source housing that contains the radioisotope source and the detector-transmitter that contains the scintillation detector and electronics. Sources are available in a fan beam or strip source configuration. For most fan beams, the beam angle spreads at a 45° angle in the vertical dimensions. A 30° beam angle spread is available with model 5210, and 60° beam angle spreads are available with models 5205B, 5206B, 5207B, and 5208B.

Strips sources emit radiation evenly along the length of the vessel from the source and measure the radiation level reaching the detector after passing through the vessel walls and the process material.

The scintillation detector is available in lengths ranging from 1 to 12 feet, in 2-foot increments. For a tall or narrow tank, multiple sources and / or detectors might be required. Contact Thermo Fisher. The specific source - detector configuration depends on the application. Three possible configurations are illustrated below.

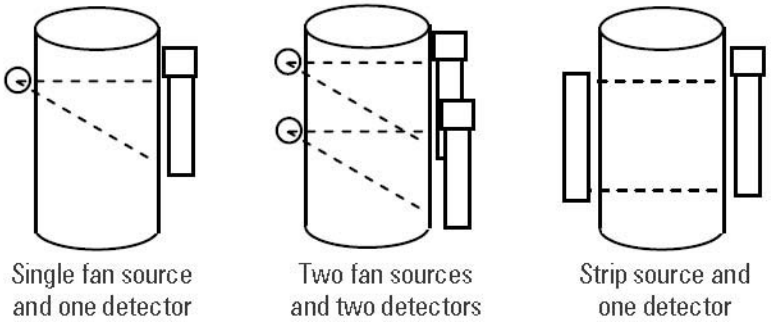

Figure 3–1.

Guidelines

Warning Do not install the system in any hazardous area other than those approved. Refer to the equipment tag for the specific approvals applicable to the configuration of your instrument. ▲

Warning Do not apply power to the instrument in any hazardous area unless the safety ground is properly wired inside the instrument and the cover is properly installed. ▲

Instrument approvals are listed in Appendix B.

General

Review the following guidelines when planning gauge installation:

1. Correct power source is available. See "Power Requirements" later in this chapter.

2. You will need to supply the necessary brackets and hardware required for mounting the gauge to the vessel.

3. Operating temperature range: -40°C to +60°C (-40°F to +140°F).

4. There should be enough clearance to install and service the source housing and the detector. Refer to the appropriate dimensional drawings in the drawing appendix.

5. Position the source housing so the radioactive source identification tag is visible. Mount it so the tag is upright.

6. The gauge **should not** be mounted where process overflow or other material can collect in the beam path. The source housing shutter mechanism must be kept free of debris.

7. If the handheld terminal will be used for configuration, the connection must be located in a safe area.

System Power Requirements

Ensure the correct power source is available. One of the following input power sources is required: 24 Vdc ± 20% or 115/230 Vac ± 15%, 50/60 Hz (requires optional AC power board). The maximum power requirement is 12 VA. Both DC and AC power may be supplied to the gauge at the same time. The gauge will draw power from whichever input source provides the higher DC source voltage.

Protective Earth Grounding

The LevelPRO enclosure provides internal safety ground and external safety ground lugs (reference drawing 868503) for Safety Protective Earth Grounding. The external safety ground lug is used to connect the unit to Earth Ground. The internal safety ground lug is used to connect the AC power input ground line.

Safety Disconnecting Means Requirements

As a permanently connected equipment, the LevelPRO gauge requires a switch or circuit breaker as the means for disconnection. The customer needs to prepare the switch or circuit breaker according to the following requirements:

1. A switch or circuit breaker must be included in the building installation.
2. It must be in close proximity to the equipment (LevelPRO) and within easy reach of the operator.
3. It must be marked as the disconnecting device for this equipment (LevelPRO).

Detector-Transmitter

Warning Do not install the system in any hazardous area other than those approved. Refer to the equipment tag for the specific approvals applicable to the configuration of your instrument. ▲

Warning Do not apply power to the instrument in any hazardous area unless the safety ground is properly wired inside the instrument and the cover is properly installed. ▲

Warning For hazardous location installations, the cable entries must be sealed per the installation layout drawing (868502). ▲

Warning For non-hazardous location installations, the enclosure cable entries must be sealed with a compound to protect against the passage of gas or vapors. The sealing compound should not be affected by the surrounding atmosphere or liquids. The sealing compound must have a thickness of at least 5/8 inch (16 mm). ▲

Warning Use proper lifting procedures during installation to avoid injury. Refer to drawings 868672 or 868674 (water-cooled units) for weights and dimensions of the detector housing. ▲

Alignment

Refer to drawings 868502 and 868672 (868674 for water-cooled units) for mounting dimensions of the detector-transmitter.

The source housing and detector are normally installed across the diameter of the vessel. If mechanisms internal to the process vessel would interrupt the radiation beam, you can move the installation slightly off center. Contact Thermo Fisher if the angle between the source and detector will be less than 130°, as illustrated below.

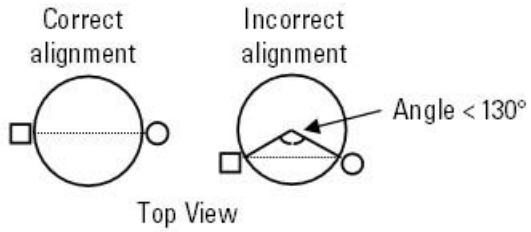

Figure 3–2.

It is important to mount the source housing securely, since any movement or change in alignment can affect the gauge's calibration. When mounting the source housing, be sure to include a means of aiming the beam several degrees left or right so the source beam can be aligned with the detector. The exact mounting method will vary depending on the application.

Align the center of the source beam path as closely as possible with the centerline of the detector housing. The source beam is narrow horizontally, and the radiation is uniform only in the primary (center) part of the beam. The shielding in the source housing attenuates the radiation in the secondary part of the beam. The sensitive area of the detector is the center 2-7/8 inches (73 mm) across the width of the detector's housing. This area should lie entirely within the primary beam.

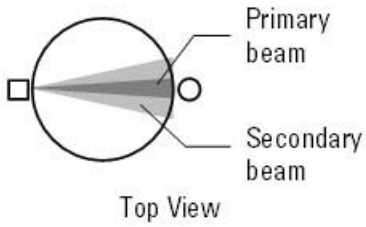

Figure 3–3.

To determine the primary beam width, you will need the included angle of the beam. For example, the included angle is typically 12°. In this case, the primary beam width will be 1 foot wide 5 feet away from the source. At 10 feet away from the source, the beam width will be 2 feet wide, and so on. This is illustrated in the figure below.

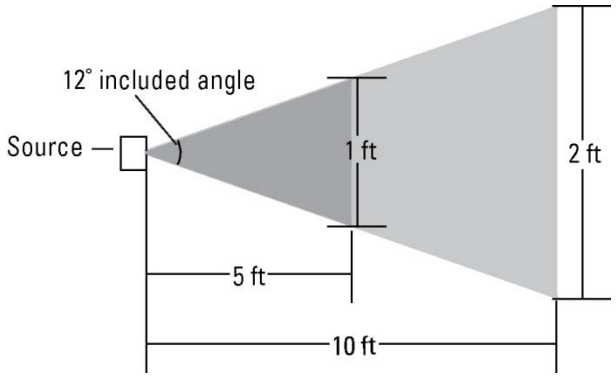

Figure 3–4. Determining primary beam width

Measurable Range

Before beginning the installation, verify that the measurable range (the range over which the process level can be measured) of the proposed installation meets the requirements of your application. The top and bottom of the measurement range depend on the source type (fan or strip), the detector length, and the position of the source relative to the detector's sensitive length. Sensitive length refers to the part of the detector that senses radiation.

Note The sensitive length of the detector is approximately the length from the upper mounting bolt to the lower mounting bolt. ▲

Top of Range

For a source with a fan beam, the top of the range is at the top of the sensitive length of the detector or at the center of the source housing, whichever is lower.

For a strip source, the top of the range is at the top of the sensitive length of the detector or at the top of the active length of the source, whichever is lower.

Bottom of Range

For a source with a fan beam, the bottom of range is the point where a line drawn from the source to the detector centerline at the bottom end of the detector's sensitive length intersects the inner vessel wall nearest the detector. This is illustrated in Figure 3–5.

Note If the vertical beam width of the source does not fully illuminate the sensitive length of the detector, the bottom of the range is the point at which the lower limit of the source beam intersects the inner vessel wall. ▲

For a strip source, the bottom of the range is at the bottom of the detector's sensitive length or at the bottom of the active length of the source, whichever is higher.

In Figure 3–5, the top of the source beam (center of the source housing) is aligned with the top of the sensitive length of the detector. Thus, the top of the measurable range is defined by the horizontal line drawn from the top of the sensitive length of the detector to the center of the source housing.

The bottom of the range (BR), measured from the top of the measurable range, is provided by the formula:

$$BR = BD - [PD \times BD / SD]$$

or, equivalently,

$$BR = BD \times [1 - (PD / SD)]$$

where

BD = distance from top of range to the bottom of the sensitive length of the detector (in Figure 3–5, BD = sensitive length of detector).

PD = distance from the center of the detector to the inner vessel wall.

SD = distance from the center of the detector to the center of the source.

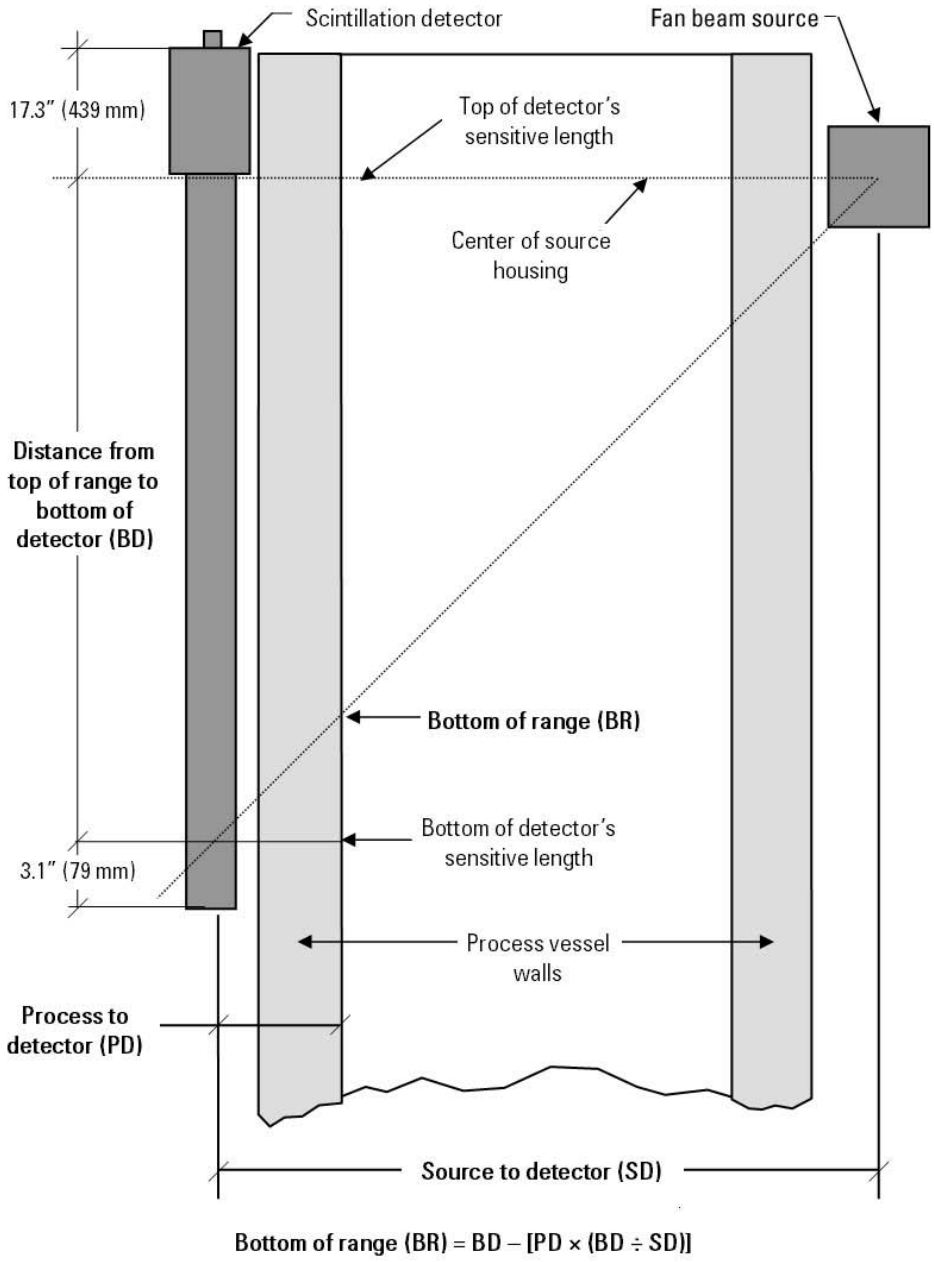
Scintillation detector
Fan beam source
17.3" (439 mm)
Top of detector's sensitive length
Center of source housing
Distance from top of range to bottom of detector (BD)
Bottom of range (BR)
Bottom of detector's sensitive length
3.1" (79 mm)
Process vessel walls
Process to detector (PD)
Source to detector (SD)
Bottom of range (BR) = BD – [PD × (BD ÷ SD)]

Figure 3–5. Scintillation detector with fan beam source

The Source Housing

Warning In the United States, you may uncrate and mount the source housing, but you may not remove the shipping bolt unless you are licensed to commission the gauge. In Canada, you must have a license condition permitting mounting / dismounting, and without this condition, users may not remove the source from the shipping crate. ▲

Warning Use proper lifting procedures to avoid injury. ▲

The scintillation detector can be used with either a fan beam source or a strip source. Normally the scintillation detector is mounted so that the top of the detector's sensitive length is even with the top of the fan beam or even with the top of the active length of the strip source.

Fan Beam Source Guidelines

Note the following if using a source with a fan beam.

1. The vertical angle of the fan beam is typically 45°. This means that the beam's vertical range is equal to the horizontal distance between the detector and the source. (In special cases, the angle may be 30° or 60°. Contact Thermo Fisher for guidance.)

2. Mount the source housing so that the top of the fan beam is aligned with the top of the sensitive length of the detector.

3. Install the source housing with its mounting face as close to the process vessel as practical, with no structural material (mounting tabs, brackets, etc.) between the beam area and the vessel.

4. The mounting should ensure accurate beam alignment with the detector and provide for easy left-right angular adjustment. The top of the beam should be even with the top of the measurable range.

Strip Source Guidelines

Note the following if using a strip source.

1. Refer to the source housing drawings to determine the position of the active length of the strip source and other mounting dimensions.

2. Secure the housing with the 1/2-inch (12 mm) bolts and lock washers (six places). The housing mounting face allows clearance for bolts or studs extending up to 2-1/4 inches (57 mm) from the mounting surface.

3. For best results, the measurable range should be less than the active length of the strip source(s). Position the strip source so that the bottom of the active length of the source is even with the minimum level to be measured. If the measurable range must be greater than the active length of the strip source, position the top of the active length of the source so that it is even with the maximum level to be measured.

4. The mounting surface should be vertical. The mounting should ensure accurate beam alignment with the detector and provide for easy left-right angular adjustment.

5. Install the source housing with its mounting face as close to the vessel as practical, with no structural material (mounting tabs, brackets, etc.) between the beam area and the vessel.

Shutter Actuator

If your source housing includes a pneumatic shutter actuator, refer to drawing 866664 for installation details.

Multiple Detectors / Source Housings

Certain applications may require the use of multiple detectors and / or multiple source housings to span the desired measurable range.

If multiple detectors are used, the uppermost unit should be mounted so that the top of its sensitive length is even with the top of the measurable range. The remaining units should be mounted so that the top of each detector's sensitive length is aligned with or slightly overlaps the bottom of the sensitive length of the detector mounted just above it.

If more than one source housing is required, the top source housing should be installed with the top of its beam even with the top of the desired measurable range. The other source housings should be spaced evenly along the vertical dimension of the vessel. For example, if the range of interest is 12 feet and three fan beam sources are used, the source housings should be spaced four feet apart.

The installation / arrangement drawings provide mounting dimensions for several configurations (refer to drawings 868566 through 868571).

When mounting two or more pairs of strip sources and detectors on a small diameter tank, adjacent pairs of source housings and detectors may be rotated by 90° if necessary. The source housing and detector for each source-detector pair at the same height must still be mounted on opposite sides of the tank (180°). After mounting the uppermost source-detector pair, the position of the source housing and detector in the next lower pair may be rotated by 90° and so on.

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Chapter 4
Wiring

Overview

Wiring should be performed in the following order:

1. Power to the gauge
2. Remote computer terminal or HHT to the gauge via the serial communication ports
3. Optional wiring:
   a. 4–20 mA current output
   b. Relay contacts
   c. Contact closure inputs
   d. Remote display
   e. Auxiliary 4–20 mA current input
   f. Wiring to cascade multiple units

Preparation

Review the following carefully prior to connecting any wiring.

Warning Remove all power from the unit before making any connections. Electrocution can result if power is present. ▲

Warning All wiring must be done by qualified individuals in accordance with applicable codes such as the NEC (National Electric Code) ANSI / NFPA 70 specifications or the Canadian Electrical Code Part 1. ▲

Warning Do not apply power to the unit in any hazardous area unless the safety ground is properly wired inside the unit and the cover is properly installed. ▲

Warning For hazardous location installations, the cable entries must be sealed per the installation layout drawing (868502). ▲

Warning For non-hazardous location installations, the cable entries into the enclosure must be sealed with a compound to protect against the passage of gas or vapors. The sealing compound should not be affected by the surrounding atmosphere or liquids. The sealing compound must have a thickness of at least 5/8 inch (16 mm). ▲

Warning If metal conduit is used, the conduit must be grounded. ▲

Warning Connect the AC wiring earth ground to the internal safety ground terminal, as shown in the wiring diagram. Refer to "Optional AC Power" later in this chapter to change the AC supply voltage. ▲

Wiring Drawings

The installation layout drawing (868502) provides general guidance for routing the cables to the unit. The installation wiring drawing (868503) shows the function of each connector pin on the CPU board and optional AC power / relay board. In addition, the drawing shows cable requirements for connecting the sensor to the transmitter, power requirements, and grounding locations.

The label on the top of the detector-transmitter chassis also shows connector pin information for wiring the power boards, including the relay contacts, the contact closure inputs, and the current output. Drawing 868519 provides additional instructions for wiring the RS485 and RS232 serial port connectors.

General Procedure

Follow this general procedure to access the detector electronics for wiring.

1. Ensure all source housing shutters are in the OFF position.

2. Ensure all power to the gauge is turned off.

3. Remove the housing access cover by loosening the screw on the cover retaining bracket and sliding the bracket off of the housing cover. Unscrew the housing access cover. Two lugs on the top of the cover aid with removal.

4. Remove the cable conduit plugs from the hole(s) that will be used. As shown in the installation layout drawing (868502), lay one conduit for the DC power input and signal cables and a second conduit for the AC power input and relays, if applicable. Route the cables into the detector housing and connect input power and signal wires as shown in the wiring drawing (868503).

5. The ground line of the AC input power needs to be connected to the internal safety ground lug of the LevelPRO housing.

6. When DC input power is used, it is imperative that an Earth Ground be connected to either the internal or external safety ground lug of the LevelPRO housing.

7. Pull each cable through the correct conduit fitting and into the enclosure. Leave approximately 6 inches (150 mm) for strain relief. Secure the conduit, making sure it is completely sealed.

8. Continue through the remaining sections in this chapter for wiring instructions specific to the power supply, serial and HART® communications, etc.

9. When the wiring is complete, replace the detector housing cover, and secure the cover retaining bracket.

10. While the mounting hardware of the LevelPRO housing may provide an adequate earth ground, it is recommended that a true earth ground always be connected to the external safety ground lug of the housing.

The CPU Board

The CPU board is the system's main board. The gauge is shipped from the factory with all CPU jumpers configured properly for your system configuration. Should you need to replace the CPU board, note the jumper settings for connectors J7 (current output configuration) and J11 (system configuration) before replacing the board. After installing the new board, verify that the jumpers are set properly for your system configuration. Figure 4–1 shows the location of connectors and jumpers.

System Configuration

J11 on the CPU board is the connector for system configuration jumpers. Move the jumper at pins 5 and 6 to pins 4 and 5 to enable the CPU to recognize optional relays mounted on the power supply board. Later units will be shipped with the jumper already at pins 4 and 5, even if the relay option is not purchased.

Move the jumper to pins 1 and 8 of the J11 connector to erase system memory.

Caution Placing a jumper across pins 1 and 8 on the J11 connector erases system memory. All user-entered parameters are erased and reset to factory defaults. ▲

If you are going to erase memory by placing a jumper across pins 1 and 8, first remove power from the detector-transmitter. Note the location of the jumpers on the J11 connector. Place a jumper across pins 1 and 8, apply power, and leave power on for approximately 30 seconds to erase memory. Remove power and restore the configuration jumpers to their original settings.

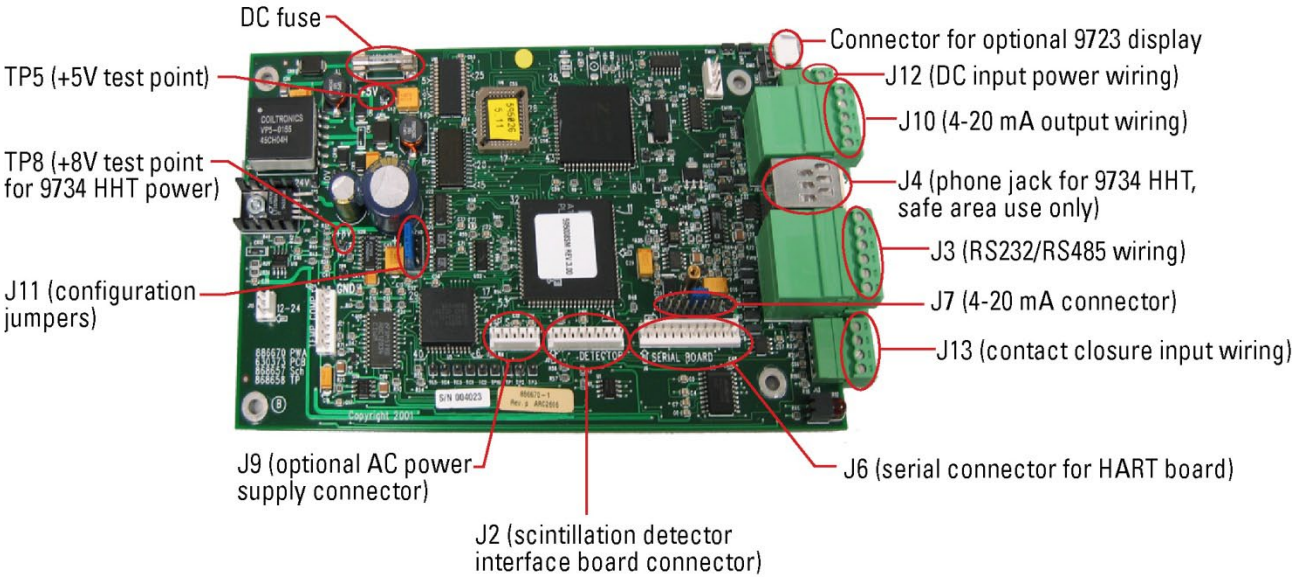
DC fuse
TP5 (+5V test point)
TP8 (+8V test point for 9734 HHT power)
J11 (configuration jumpers)
Connector for optional 9723 display
J12 (DC input power wiring)
J10 (4-20 mA output wiring)
J4 (phone jack for 9734 HHT, safe area use only)
J3 (RS232/RS485 wiring)
J7 (4-20 mA connector)
J13 (contact closure input wiring)
J9 (optional AC power supply connector)
J2 (scintillation detector interface board connector)
J6 (serial connector for HART board)

Figure 4–1. Connectors and jumpers on the CPU board

Power Supply

The system is designed to operate on 24 Vdc. If the optional AC power board is installed, the system can also operate on 115 or 230 Vac (± 15%), 50/60 Hz. The maximum input power requirement is 12 VA. If both AC and DC power are supplied to the detector, the detector will draw power from whichever source provides the higher DC voltage.

The maximum length of the cable that can be used to supply power varies depending on the wire gauge. Refer to the wiring drawing (868503) for cable information and other wiring details.

Warning All wiring must be done by qualified individuals in accordance with applicable codes such as the NEC (National Electric Code) ANSI / NFPA 70 specifications or the Canadian Electrical Code Part 1. For intrinsically safe systems, refer to ANSI / ISA RP 12.6. ▲

Note To meet the requirements of CSA 1010.1, an external switch or circuit breaker must be installed to allow the power source to be disconnected from the gauge. In addition, protective bonding (grounding) must always be provided, even if DC power is used. ▲

DC Power

J12 on the CPU board is the connector for the DC source voltage wiring. Refer to the wiring drawing (868503) and to the table below for connections.

Table 4–1. DC power connections

Power Supply	J12 on CPU Board
Positive (+)	J12-2
Negative (-)	J12-1

Note To meet the requirements of CSA 1010.1, the input DC terminals must be supplied from a SELV (Safety Extra Low Voltage) source. ▲

Optional AC Power

If the optional AC power board is installed, the gauge may be operated using 115 or 230 Vac. The AC selector switch is shown in the figure below.

Caution Applying 230 Vac with the selector switch in the 115 Vac position will damage the equipment. ▲

J9 on the CPU board is the connector for the AC power supply, and J17 on the AC power supply is the wiring connector. Refer to the wiring drawing (868503) and to the figure below.

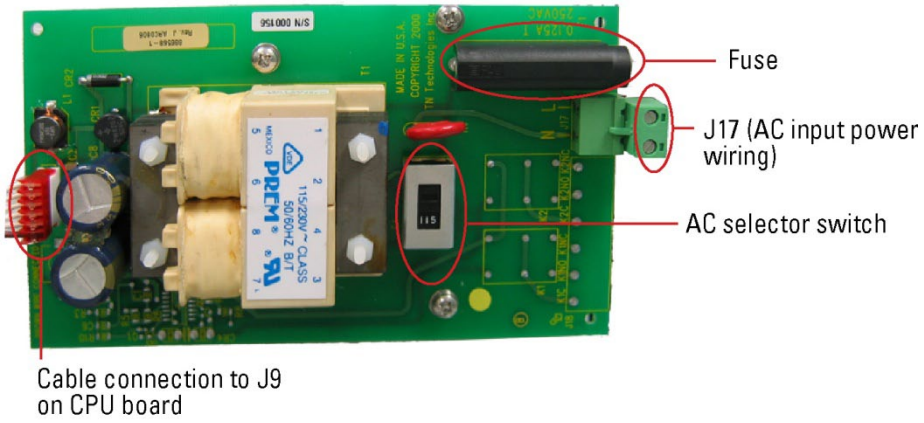

Figure 4–2. AC power supply board

Caution For reliable operation and to maintain safety approval, the F1 fuse on the AC power board must only be replaced with an approved fuse. ▲

Warning Remove all power from the unit before making any connections. Electrocution can result if power is present. ▲

Relays

The AC power supply option can be purchased with two relays. Relay contacts are Form C SPDT, isolated 8 A, 220 Vac. The relays can be configured to open or close on events or faults or with level measurement. Refer to the LevelPRO user manual for instructions.

Refer to the wiring drawing (868503) and the label inside the transmitter cover for wiring details.

Serial Communications

The gauge provides one RS232 single drop and one RS485 multi-drop serial interface. Screw terminal connectors for both ports are located at J3 on the CPU board.

The RS485 connector includes the +8 Vdc required to power the Thermo Scientific 9734 handheld terminal (HHT) as well as the +DATA and –DATA connections. An RJ11 (phone jack) connector is also provided for the RS485 port at J4 on the CPU board. The HHT can be connected directly to the RJ11 connector in safe areas.

Both ports provide independent access to the measurement readings and software functions. They are always active and can be used to display measurements. The setup menus, however, may only be accessed by one port at a time.

RS485 Wiring

Connecting the serial (COM) port on a PC to the RS485 port on the gauge requires the RS485 / RS232 converter (p/n OTO515D).

1. Connect J3-12 (+DATA) and J3-11 (–DATA) to the corresponding connections on the RS485 / RS232 converter.

2. Connect the converter to the PC using the supplied DB9 serial cable.

3. Refer to drawings 868519 and 868503 for additional details.

Initial Setup for Party-Line Communications

To communicate with multiple gauges via a RS485 party-line, each unit must be assigned a unique unit identification number so it can be addressed individually. All gauges are assigned unit number 0 (zero) by default.

To assign a unique unit number to each gauge, you must be able to communicate with each one individually. Disconnect each gauge from the party-line in turn and communicate with the disconnected gauge directly. Alternately, you can remove power from all gauges except one and assign a unit number to the powered gauge.

If you have trouble using another device on the RS485 chain, verify that it is properly terminated for its position on the chain. To terminate a device, connect a 120-ohm resistor between its RS485 + / - data terminals. Never terminate more than the first and last device in the chain.

RS232 Wiring

The serial port on a PC (COM1 or COM2) can be connected directly to the RS232 port on the gauge. This requires five wires: ground, transmit (TX), receive (RX), request-to-send (RTS), and clear-to-send (CTS). The connections between the RS232 port (J3 on the CPU board) and the PC serial port are summarized in the table below for standard DB9 and DB25 PC serial port connectors.

Table 4–1.

J3 on CPU Board	PC Serial Port DB9 Connector	PC Serial Port DB25 Connector
J3-2 (RX)	Pin 3	Pin 2
J3-3 (TX)	Pin 2	Pin 3
J3-4 (RTS)	Pin 8	Pin 5
J3-5 (CTS)	Pin 7	Pin 4
J3-6 (GND)	Pin 5	Pin 7

Using Serial Communications

To communicate with the gauge from a PC requires that the PC be running a terminal emulation software. The default communication settings for the gauge's RS485 and RS232 ports and for the HHT are: 7 data bits, Even parity, 1 stop bit, 9600 baud.

Refer to the LevelPRO user guide for additional details about setting up and using serial communications.

HART Communications

The HART® communication protocol is supported over the 4–20 mA current output with the HART interface board. The HART interface board is an optional daughter board that is wired via a cable to J6 on the CPU board. Communication with the gauge is via the 275 or 375 Field Communicator from Emerson Electric Co. Refer to the LevelPRO HART operation manual (p/n 717817) for detailed instructions.

Note HART communication protocol allows you to configure and calibrate the gauge in most applications; however, due to limitations of the protocol, the complete range of functions is only available when using the Thermo Scientific Model 9734 handheld terminal and the RS485 port. ▲

FOUNDATION Fieldbus Communications

With FOUNDATION fieldbus, the gauge provides users with access to control or program parameters via a host system. The fieldbus connector is accessible from the faceplate of the LevelPRO, and the only connections required for operation are to the H1 bus.

Refer to the LevelPRO with FOUNDATION fieldbus application guide for specific wiring instructions.

Contact Closure Inputs

The contact closure inputs are dry contact inputs between ground and Switch 1 and ground and Switch 2 at J13 on the CPU board. The gauge can be configured via software settings to execute a command or other function upon a user-provided contact opening or closing. Refer to the LevelPRO user manual for instructions on assigning commands to the contact closure inputs.

When operating in "cascade" mode, where multiple units are wired together to act as a single detector, contact closure Switch 2 is dedicated to performing the cascading function. Refer to drawings 868503 and 868529.

Current Output

Following are the configurations available for the 4–20 mA current output:

- Isolated, loop-powered (default)
- Non-isolated, self-powered
- Isolated, self-powered output (requires optional piggyback board p/n 886595)

The isolated, loop-powered or non-isolated, self-powered configurations can drive an 800 ohm maximum load over the full current output range. The isolated, self-powered current output can drive a maximum load of 1000 ohms. The current output is programmable between 3.8 and 20.5 mA. The fault low condition for the current output is 3.6 mA or less, and the fault high condition is 20.8 mA or greater.

Isolated, Loop Powered Configuration

The default current output configuration is isolated, loop-powered. With this configuration, the 4–20 mA loop is supplied by the customer's PLC or DCS. A jumper is placed across pins 4 and 5 of the J7 connector on the CPU board. J10-6 and J10-7 are for the 4–20 mA output connections.

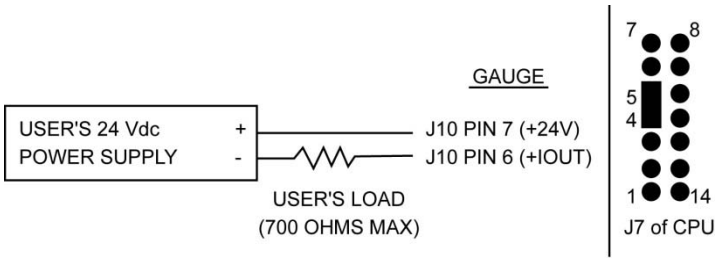

Figure 4–3. 4–20 mA loop powered configuration

Non-Isolated, Self-Powered Configuration

With the non-isolated, self-powered configuration, power for the 4–20 mA loop is supplied by the gauge, but it is not isolated from the gauge circuitry. A jumper is placed across pins 3 and 4 of the J7 connector on the CPU board. J10-6 and J10-9 are for the 4–20 mA output connections.

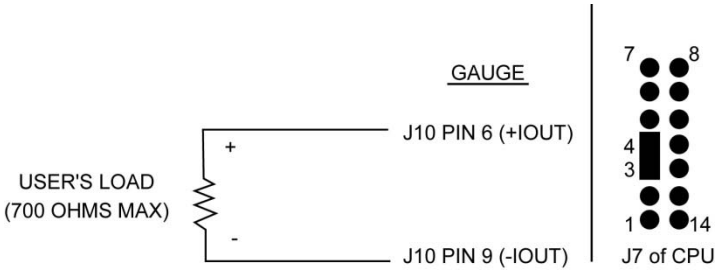

Figure 4–4. 4–20 mA non-isolated, self-powered configuration

Isolated, Self-Powered Configuration

With the isolated, self-powered configuration, power for the 4–20 mA loop is supplied by the gauge, and the output is isolated from the gauge circuitry. The isolated piggyback board (p/n 886595-1) must be installed on the CPU (see Figure 4–5). This puts the 4–20 mA output on connections J10-6 and J10-8. No jumpers are used for this configuration.

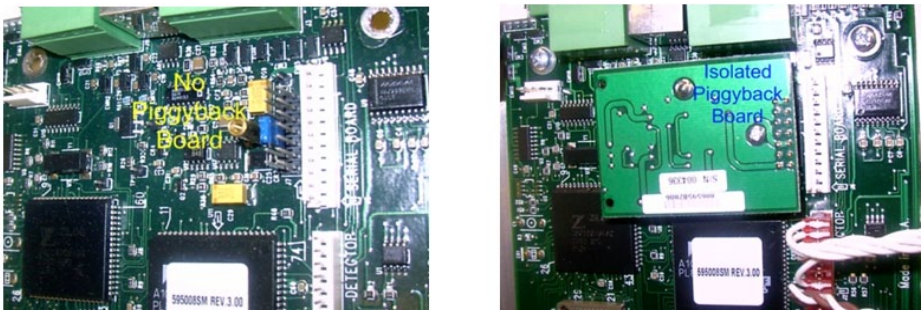

Figure 4–5. Isolated piggyback board

Cascade Mode Wiring

For applications requiring a detector length greater than twelve feet, multiple units can be wired together to act as one continuous detector. In this situation, the highest or top gauge in the line, or cascade, is the master. All wiring for the serial ports, relays, etc. is done in the master unit. Remaining units are slave units. All slaves must be powered in the same manner as the master (either AC or DC).

The lowest gauge in the line must be wired with its CASCADE OUT to the CASCADE IN of the gauge directly above it. Each gauge in the cascade is wired in this manner (CASCADE OUT to the CASCADE IN of the next unit), up to the master gauge. The master has only a CASCADE IN.

Each gauge takes the count rate coming into it on the CASCADE IN line from the detector immediately below it, adds the value to its own internal count rate, and then outputs the total on the CASCADE OUT line to the detector immediately above in the cascade.

Refer to drawings 868503 and 868529 in the drawing appendix for the wiring requirements. Additional information on cascade mode wiring can be found in Technical Bulletin TB-0416-019.

Auxiliary Input Wiring

There is an auxiliary connection on connector J10 for applications requiring an outside 4–20 mA signal be input into the LevelPRO and used as a form of compensation adjustment (vapor density, pressure, etc.). The outside 4–20 mA signal should be wired so that the positive connection of the loop is connected at J10 pin 1 and the negative side connected to J10 pin 2. The special equation is then utilized to incorporate this input into the LevelPRO program. Refer to the LevelPRO user guide for information on special equations.

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Chapter 5
Service & Support

Getting Help

The troubleshooting section in the LevelPRO user guide provides several troubleshooting procedures that may help you resolve the issue you are having. It also provides a list of values that are important to record if you need to contain Thermo Fisher Scientific Technical Support.

You can contact Thermo Fisher Scientific at the locations below.

1410 Gillingham Lane Sugar Land, TX 77478 USA Tel: +1 713-272-0404 Fax: +1 713-272-2272	14 Gormley Industrial Avenue Gormley, Ontario L0H 1G0 CANADA Tel: +1 905-888-8808 Fax: +1 905-888-8828
Ion Path, Road Three Winsford, Cheshire, CW7 3GA UNITED KINGDOM Tel: +44 (0) 1606 548700 Fax: +44 (0) 1606 548711	Unit 702-715, 7/F Tower West Yonghe Plaza No. 28 Andingmen East Street Beijing 100007 CHINA Tel: +86 (10) 8419-3588 Fax: +86 (10) 8419-3580
A-101, 1CC Trade Tower Senapati Bapat Road Pune 411 016 Maharashtra, INDIA Tel: +91 (20) 6626 7000 Fax: +91 (20) 6626 7001	On the Web www.thermoscientific.com

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In the event Thermo Fisher requests return of its products, Buyer shall ship with transportation charges paid by the Buyer to Thermo Fisher plant. Shipment of repaired or replacement goods from Thermo Fisher plant shall be F.O.B. Thermo Fisher plant. A quotation of proposed work will be sent to the customer. Thermo Fisher shall be liable only to replace or repair, at its option, free of charge, products which are found by Thermo Fisher to be defective in material or workmanship, and which are reported to Thermo Fisher within the warranty period as provided above. This right to replacement shall be Buyer's exclusive remedy against Thermo Fisher.

Thermo Fisher shall not be liable for labor charges or other losses or damages of any kind or description, including but not limited to, incidental, special or consequential damages caused by defective products. This warranty shall be void if recommendations provided by Thermo Fisher or its Sales Representatives are not followed concerning methods of operation, usage and storage or exposure to harsh conditions.

Materials and / or products furnished to Thermo Fisher by other suppliers shall carry no warranty except such suppliers' warranties as to materials and workmanship. Thermo Fisher disclaims all warranties, expressed or implied, with respect to such products.

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Appendix A
Ordering Information

A complete LevelPRO system consists of one to four integrated detector-transmitter, any number of sources as applicable to the application, and a type of communication.

Table A–1. System ordering information

Code	Model
LPRO	LevelPRO integrated continuous nuclear/gamma level system
Code	**Detector/Transmitter Enclosure Type**
S	Carbon steel detector housing
W	Water-cooled jacketed steel detector housing
Code	**First Detector/Transmitter Length***
01	1 ft detector
02	2 ft detector
03	3 ft detector
04	4 ft detector
06	6 ft detector
08	8 ft detector
10	10 ft detector
12	12 ft detector
Code	**Second Detector/Transmitter Length (optional)***
XX	XX ft detector (same lengths available as first detector/transmitter)
Code	**Third Detector/Transmitter Length (optional)***
XX	XX ft detector (same lengths available as first detector/transmitter)
Code	**Fourth Detector/Transmitter Length (optional)***
XX	XX ft detector (same lengths available as first detector/transmitter)
Code	**Input Power**
A	115 Vac
B	24 Vdc
C	230 Vac

Code	Relay Output
N	No relay
R	Two SPDT relays
Code	**4–20 mA Output Type**
L	Isolated, loop-powered
S	Isolated, self-powered
N	Non-isolated, self-powered
Code	**Communications**
0	No selection
A	9734 HHT RS485 cable
B	9734 HHT RS485 & RS232 cable
C	RS232/RS485 converter
E	HART communication module
L	FOUNDATION fieldbus module
Code	**Accessories (optional)**
S	Sm SS tag (0.75 X 2.5 in), wired
L	Lg SS tag (3.3 X 2.5 in), wired
R	RJ11 modular connector jack
D	Model 9723 backlit LCD
A	3/4-in NPT to metric adapter

*Detector-transmitter lengths available in odd increments (3 ft, 5, ft, etc.) as a special order. Contact Thermo Fisher for details.

Table A–2. Spare parts

Part Number	Description
3-0702-007	Upgrade kit, FOUNDATION fieldbus, LevelPRO
88670-1	CPU
886592	Detector board. Note: If replacing an old style PCB (green "triangle" board), use kit 886776.
886595-1	ISO-24 piggyback board. Supports isolated, self-powered current output.
886568-1	AC power board, no relays.
886568-2	AC power board, 2 relays.
868568-3	Board with 2 relays, no AC power.
	AC power board fuse, F1 (LittelFuse 313.125), 250V, 0.125A (1/8A), Type T (SB), Size 3AG.

Appendix B
Specifications

Results may vary under different operating conditions.

Table B–1. Performance specifications

System performance	0.5% of span, typical

Table B–2. Gamma ray source

Source type	Cs-137 or Co-60, both stainless steel doubly encapsulated
Size	10–10,000 mCi Cs-137 or 1,000–2,000 mCi Co-60 (source size dependent upon application)
Source housing	Carbon steel, lead filled, polyurethane painted (stainless steel also available) Two-position shutter, locks in OFF (closed) position 30°, 45°, and 60° beam angle source housings available (beam angle is dependent upon application)

Table B–3. Integrated transmitter-detector

System architecture	Multiprocessor based electronics provides uninterrupted output during data entry and system interrogation Surface mount technology provides high degree of reliability All user data is doubly stored in non-volatile memory with no battery backup required
Detection type	PVT plastic scintillator with wide dynamic range; PVT resists shock and moisture damage
Detector lengths	Standard detector lengths in 2-ft increments, up to 12 ft* Multiple detectors can be wired together for large measurement spans
Power	115/230 Vac ±10%; 50–60 Hz or 24 Vdc available Surge protected 9–35 Vdc
Operating temperature	-40°C to +60°C (-40°F to +140°F), ambient
Enclosure construction	Carbon steel polyurethane painted Optional water-cooled detector for higher temperature applications

Approvals	CSA/C-US approved Class I, Div. 1, Groups B, C, & D; Class II, Div. 1, Groups E, F, & G; Class III, Div. 1; indoor and outdoor CSA ENCL 4 Intertek ATEX approved II 2 G Ex d IIC T6 IP66 CE Mark

*Detector-transmitter lengths available in odd increments (3 ft, 5, ft, etc.) as a special order. Contact Thermo Fisher for details.

Table B–4. Outputs/Inputs

Current outputs	Standard: 4–20 mA isolated, loop-powered into 800 ohms, field scalable Optional: 4–20 mA isolated, self-powered into 800 ohms, field scalable Optional: 4–20 mA non-isolated, self-powered into 800 ohms, field scalable
Serial outputs	RS485 half-duplex, RS232 full duplex Fieldbus: A Device Description (DD) for the LevelPRO is available from the Fieldbus Foundation website. The DD is a DD4 that is interpreted by a host implementing DD Services 4.x or higher.
Contact closure outputs	2X 115 Vac/28 Vdc SPDT at 10 A (230 Vac SPDT at8 A)
Inputs	Signal from another LevelPRO detector; additional input for gas density compensation or buildup available Dry contact closure

Table B–5. Mounting Hardware

Integrated transmitter/detector	Integral bolt-on bracket
Gamma ray source	Integral bolt-on bracket

Table B–6. Model 9723 local remote display

Display	2-line X 16-character backlit LCD
Qualifications	CSA/C-US: Class I, Groups B, C, and D; Class II, Groups E, F, G; Class III; Type 4 Enclosure ATEX: II 2G Ex d IIC T6 (Tamb -40°C to +60°C) EN60079-0:2006 and EN60079-1:2007
Power	Display powered from electronics
Installation site	Maximum separation from electronics: 300 ft (91.4 m)

Table B–7. Programming

Fieldbus host, such as National Instruments NI-FBUS Configurator	Provides the interface between the LevelPRO and other devices on a FOUNDATION fieldbus network.
Emerson 375/475 Field Communicator	For gauge configuration and calibration. Communicates with any LevelPRO via the current loop. BEL202FSK standard.
Thermo Scientific Model 9734 HHT	For gauge configuration and calibration. Communicates with any LevelPRO via RS485 connector. Provides upload / download of gauge configuration to/from PC via RS232 interface.
Comm PC interface software	For interfacing with up to 32 LevelPRO units over RS485. RS485 / RS232 converter provided.

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Appendix C
Drawings

Note Information presented in this chapter has been regenerated from original drawings. Every effort is made to maintain document accuracy. However, in order to enhance legibility, the documents may have been restructured and some information may have been intentionally excluded. Therefore, the drawings within this manual may not be exact duplicates of the original drawings. ▲

Note Drawings in this manual are included for reference only and may not be the current version. Contact the factory if you need a copy of the latest revision. ▲

Table C–1. Wiring

Drawing	Rev.	Description	Page
868503	F	Installation wiring – LevelPRO Model 9740A-X (3 sheets)	C–4
868519	B	RS485 installation & wiring (1 sheet)	C–7
868529	A	Multiple detectors cascade wiring, Models 9742/4/6 (1 sheet)	C–8
867627	D	Installation drawing – Local / remote display, Model 9723 – CSA (1 sheet)	C–9
867680	A	Installation drawing – Local / remote display, Model 9723 – ATEX, CSA (1 sheet)	C–10

Table C–2. Mechanical

Drawing	Rev.	Description	Page
868502	C	Installation layout – LevelPRO Model 9740A-X (1 sheet)	C–11
868672	C	Mounting dimensions – LevelPRO Model 9740A-X (1 sheet)	C–12
868674	D	Mounting dimensions – LevelPRO water-cooled Model 9740A-X (1 sheet)	C–13
868568	B	LevelPRO installation / arrangement drawing – 1 source with 1 detector (2 sheets)	C–14
868569	B	LevelPRO installation / arrangement drawing –2 sources with 1 detector (2 sheets)	C–16

Drawing	Rev.	Description	Page
868566	B	LevelPRO installation / arrangement drawing – 3 sources with 1 detector (2 sheets)	C–18
868567	B	LevelPRO installation / arrangement drawing – 2 sources with 2 detectors (2 sheets)	C–20
868570	B	LevelPRO installation / arrangement drawing – 2 sources with 3 detectors (2 sheets)	C–22
868571	B	LevelPRO installation / arrangement drawing – 3 sources with 2 detectors (2 sheets)	C–24

Table C–3. Source housings

Drawing	Rev.	Description	Page
865494	C	Mounting dimensions – Model 5205 / 5205A source housing, 100 mCi (1 sheet)	C–26
865504	C	Mounting dimensions – Model 5206 source housing, 500 mCi (1 sheet)	C–27
865514	C	Mounting dimensions – Model 5207 source housing, 2000 mCi (1 sheet)	C–28
865524	D	Mounting dimensions – Model 5208 source housing, 8000 mCi (1 sheet)	C–29
866891	A	Mounting dimensions – Model 5210 source housing, 10 Ci Cs-137, 3 Ci Co-60 (1 sheet)	C–30
868628	C	Mounting dimensions – Model 5205B source housing (1 sheet)	C–31
868629	C	Mounting dimensions – Model 5206B source housing (1 sheet)	C–32
868630	C	Mounting dimensions – Model 5207B source housing (1 sheet)	C–33
868631	C	Mounting dimensions – Model 5208B source housing (1 sheet)	C–34
860463	B	Mounting dimensions – Model 5194 strip source, 1 ft., 500 mCi (1 sheet)	C–35
860473	C	Mounting dimensions – Model 5195 strip source, 2 ft., 1000 mCi (1 sheet)	C–36
860483	C	Mounting dimensions – Model 5196 strip source, 3 ft., 1000 mCi (1 sheet)	C–37

Table C–4. Source housing options

Drawing	Rev.	Description	Page
866764	--	Interlock option for Models 5205–5208 source housings (1 sheet)	C–38
866664	B	Pneumatic actuator and position switch for Models 5205–5208 (1 sheet)	C–39
867269	B	Mounting instructions – Remote manual actuator for Models 5205–5208 (2 sheets)	C–40

Table C–5. Other

Drawing	Rev.	Description	Page
868709	C	HART retrofit, LevelPRO (1 sheet)	C–42

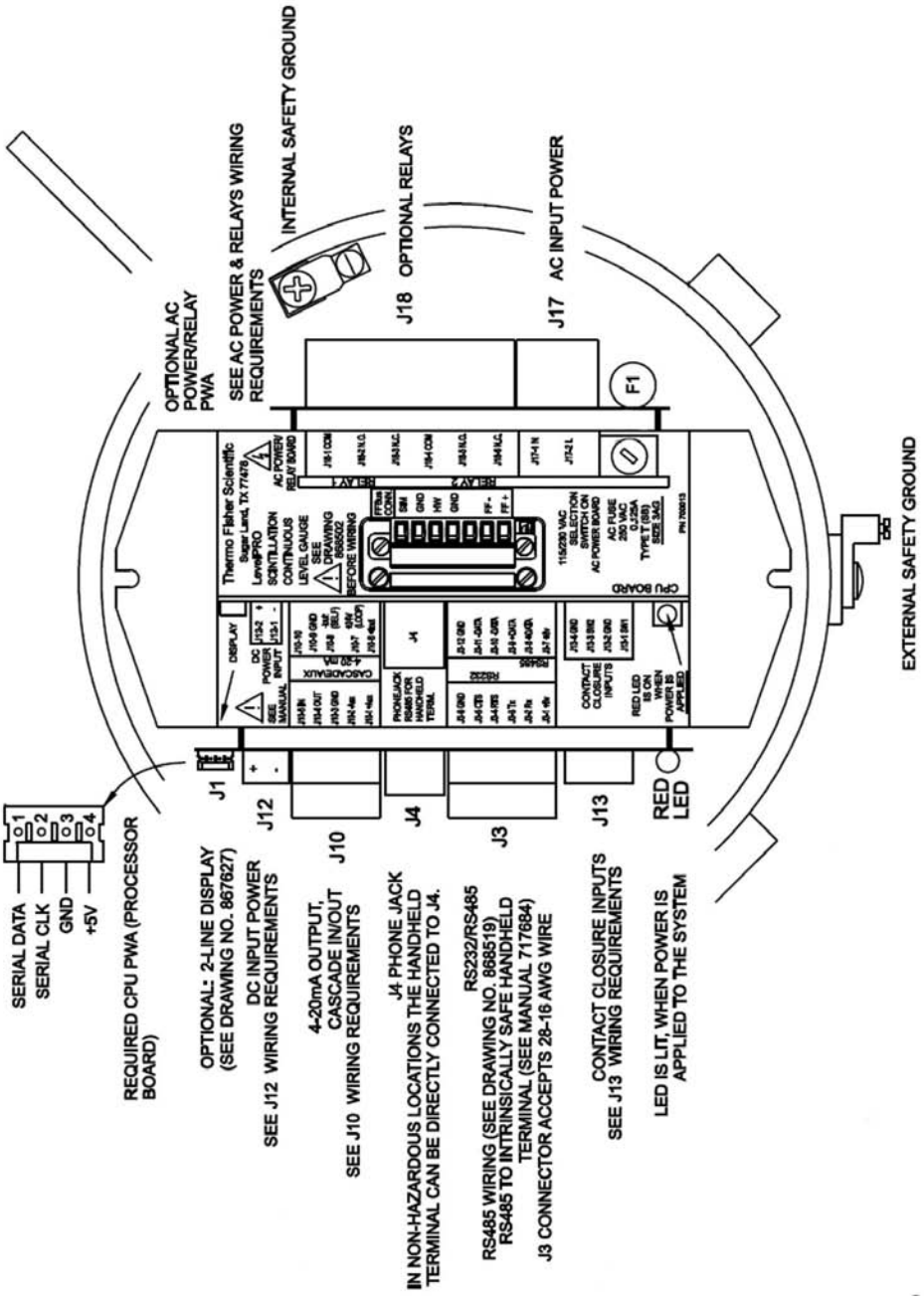


Figure C–1. 868503: Installation wiring – LevelPRO Model 9740A-X (sheet 1 of 3)

GENERAL WIRING REQUIREMENTS:

A1. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.6 AND THE NEC ANSI/NFPA 70, OR (CANADA) ACCORDING TO THE APPLICABLE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE PART 1.

A2. ALL WIRING REQUIRES A MINIMUM INSULATION RATING OF 85°C.

A3. MOST OF THE WIRING IS OPTIONAL; WITH THE EXCEPTION THAT AT LEAST ONE OF THE FOLLOWING INPUT POWER OPTIONS MUST BE APPLIED:

A. +24vDC ± 20%

B. 115 OR 230 VAC (REQUIRES AN OPTIONAL PWA.)

A4. SHIELDED CABLES MUST BE USED FOR ALL WIRING TO THE CPU (PROCESSOR BOARD).

A5. REFER TO DRAWING NO. 868529 PRIOR TO WIRING A MULTIPLE DETECTOR SYSTEM CONFIGURATION.

A6. NON-HAZARDOUS LOCATIONS:

THE CABLE ENTRIES INTO THE ENCLOSURE MUST BE SEALED WITH A COMPOUND TO PROTECT AGAINST THE PASSAGE OF GAS OR VAPORS. THE COMPOUND SHOULD NOT BE AFFECTED BY SURROUNDING ATMOSPHERE OR LIQUIDS. THE MINIMUM THICKNESS OF THE SEALING COMPOUND SHOULD BE 5/8 IN. [16mm].

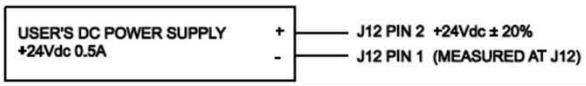
HAZARDOUS LOCATIONS:

THE CABLE ENTRIES INTO THE ENCLOSURE MUST BE SEALED PER THE INSTALLATION LAYOUT DRAWING (DRAWING NO. 868502).

NOTES AND WIRING REQUIREMENTS FOR J12

B1. USE 24-16 AWG WIRE.

B2. NO CONNECTION IS REQUIRED IF AC POWER OPTION IS PROVIDED. IF THE USER SUPPLIES BOTH AC AND DC POWER TO THE GAUGE, THE GAUGE WILL DRAW POWER FROM THE INPUT WHICH PROVIDES THE HIGHER DC VOLTAGE LEVEL.



NOTES AND WIRING REQUIREMENTS FOR J10

C1. USE 28-16 AWG WIRE.

C2. THE DEFAULT CONFIGURATION USED FOR THE 4-20mA IS AS AN ISOLATED LOOP-POWERED CONFIGURATION.

THE USER APPLIES A +24Vdc INPUT TO J10-PIN 7.

THE USER'S AMPMETER OR OTHER CURRENT MONITORING DEVICE CONNECTS AS FOLLOWS:

'+' TO J10-PIN 6 OF THE GAUGE.

'-' TO THE RETURN OF THE USER'S +24Vdc SUPPLY.

C3. THE 4-20mA CAN BE RE-CONFIGURED AS A NON-ISOLATED SYSTEM-POWERED OUTPUT BY:

MOVING THE JUMPER ON J7 OF THE CPU BOARD FROM PINS 4 AND 5 TO PINS 3 AND 4.

IN THIS CONFIGURATION: J10 PIN 6 IS IOUT+ AND J10 PIN 9 IS IOUT-.

C4. THE 4-20mA CAN BE RE-CONFIGURED AS AN ISOLATED SYSTEM-POWERED OUTPUT BY:

INSTALLING A PIGGY-BACK BOARD (TN P/N 886595) TO THE J7 CONNECTOR ON THE CPU BOARD.

IN THIS CONFIGURATION: J10 PIN 6 IS IOUT+ AND J10 PIN 8 IS IOUT-.

DESIGNATION	DESCRIPTION	MAX. VOLTAGE	MAX. CURRENT
PIN 1	+ AUX {INPUT}	5V	20mA
PIN 2	- AUX {INPUT}	5V	20mA
PIN 3	GND		
PIN 4	CASCADE OUT {CMOS PULSES} SEE DRAWING NO. 868529	5.3V OUT	< 1mA
PIN 5	CASCADE IN {CMOS PULSES} SEE DRAWING NO. 868529	5.3V IN	< 1mA
PIN 6	I Out +	+29V	20mA
PIN 7	+24V LOOP POWER IN	+29V	20mA
PIN 8	I OUT - {IF SELF-POWERED} SEE NOTE C4.	+29V	20mA
PIN 9	GND	N/A	N/A
PIN 10	Not Used	N/A	N/A

4-20mA

☐ LOOP-POWERED (DEFAULT)

☐ NON-ISOLATED SYSTEM-POWERED

☐ ISOLATED SYSTEM-POWERED

Figure C–2. 868503: Installation wiring – LevelPRO Model 9740A-X (sheet 2 of 3)

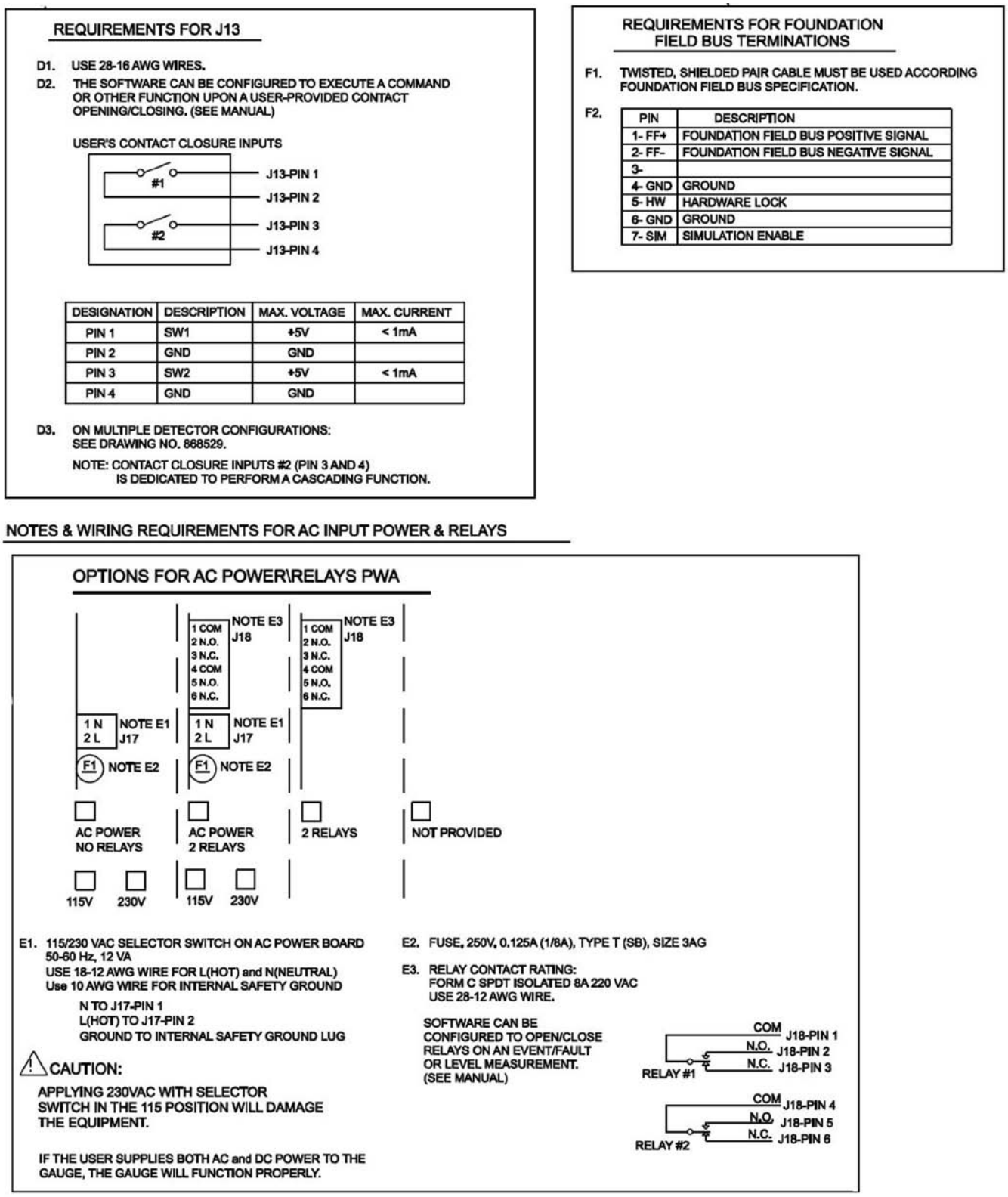

REQUIREMENTS FOR J13
D1. USE 28-16 AWG WIRES.
D2. THE SOFTWARE CAN BE CONFIGURED TO EXECUTE A COMMAND OR OTHER FUNCTION UPON A USER-PROVIDED CONTACT OPENING/CLOSING. (SEE MANUAL)
USER'S CONTACT CLOSURE INPUTS
#1
#2
J13-PIN 1
J13-PIN 2
J13-PIN 3
J13-PIN 4
DESIGNATION | DESCRIPTION | MAX. VOLTAGE | MAX. CURRENT
PIN 1 | SW1 | +5V | < 1mA
PIN 2 | GND | GND |
PIN 3 | SW2 | +5V | < 1mA
PIN 4 | GND | GND |
D3. ON MULTIPLE DETECTOR CONFIGURATIONS: SEE DRAWING NO. 868529.
NOTE: CONTACT CLOSURE INPUTS #2 (PIN 3 AND 4) IS DEDICATED TO PERFORM A CASCADING FUNCTION.
REQUIREMENTS FOR FOUNDATION FIELD BUS TERMINATIONS
F1. TWISTED, SHIELDED PAIR CABLE MUST BE USED ACCORDING FOUNDATION FIELD BUS SPECIFICATION.
F2.
PIN | DESCRIPTION
1- FF+ | FOUNDATION FIELD BUS POSITIVE SIGNAL
2- FF- | FOUNDATION FIELD BUS NEGATIVE SIGNAL
3- |
4- GND | GROUND
5- HW | HARDWARE LOCK
6- GND | GROUND
7- SIM | SIMULATION ENABLE
NOTES & WIRING REQUIREMENTS FOR AC INPUT POWER & RELAYS
OPTIONS FOR AC POWER\RELAYS PWA
1 COM 2 N.O. 3 N.C. 4 COM 5 N.O. 6 N.C.
NOTE E3 J18
1 N 2 L
NOTE E1 J17
F1
NOTE E2
AC POWER NO RELAYS
AC POWER 2 RELAYS
2 RELAYS
NOT PROVIDED
115V
230V
E1. 115/230 VAC SELECTOR SWITCH ON AC POWER BOARD 50-60 Hz, 12 VA
USE 18-12 AWG WIRE FOR L(HOT) and N(NEUTRAL)
Use 10 AWG WIRE FOR INTERNAL SAFETY GROUND
N TO J17-PIN 1
L(HOT) TO J17-PIN 2
GROUND TO INTERNAL SAFETY GROUND LUG
CAUTION:
APPLYING 230VAC WITH SELECTOR SWITCH IN THE 115 POSITION WILL DAMAGE THE EQUIPMENT.
IF THE USER SUPPLIES BOTH AC and DC POWER TO THE GAUGE, THE GAUGE WILL FUNCTION PROPERLY.
E2. FUSE, 250V, 0.125A (1/8A), TYPE T (SB), SIZE 3AG
E3. RELAY CONTACT RATING: FORM C SPDT ISOLATED 8A 220 VAC
USE 28-12 AWG WIRE.
SOFTWARE CAN BE CONFIGURED TO OPEN/CLOSE RELAYS ON AN EVENT/FAULT OR LEVEL MEASUREMENT. (SEE MANUAL)
COM J18-PIN 1
N.O. J18-PIN 2
N.C. J18-PIN 3
RELAY #1
COM J18-PIN 4
N.O. J18-PIN 5
N.C. J18-PIN 6
RELAY #2

Figure C–3. 868503: Installation wiring – LevelPRO Model 9740A-X (sheet 3 of 3)

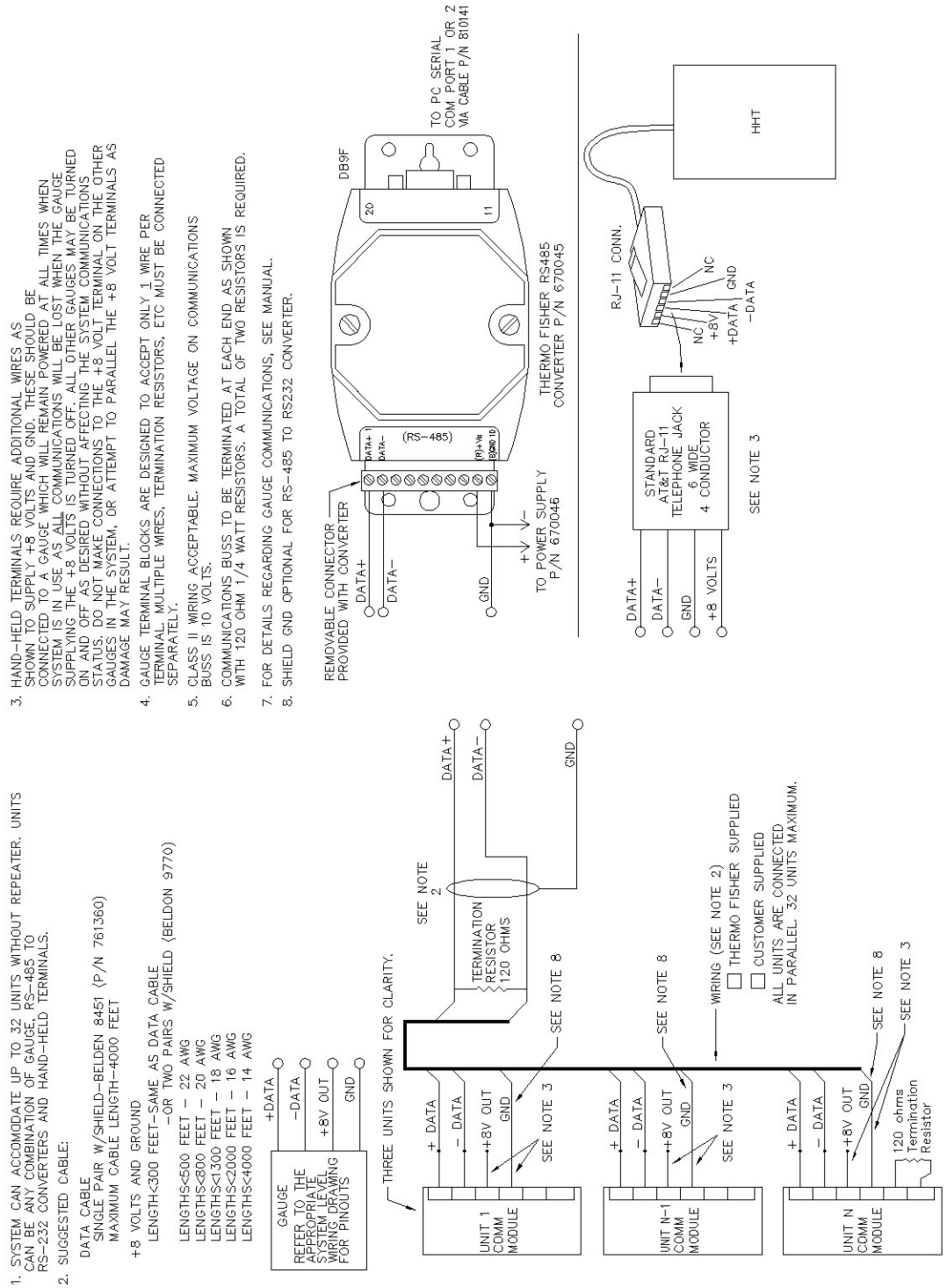

1. SYSTEM CAN ACCOMODATE UP TO 32 UNITS WITHOUT REPEATER. UNITS CAN BE ANY COMBINATION OF GAUGE, RS-485 TO RS-232 CONVERTERS AND HAND-HELD TERMINALS.
2. SUGGESTED CABLE:
DATA CABLE
SINGLE PAIR W/SHIELD-BELDEN 8451 (P/N 761360)
MAXIMUM CABLE LENGTH-4000 FEET
+8 VOLTS AND GROUND
LENGTH<300 FEET-SAME AS DATA CABLE
-OR TWO PAIRS W/SHIELD (BELDON 9770)
LENGTHS<500 FEET - 22 AWG
LENGTHS<800 FEET - 20 AWG
LENGTHS<1300 FEET - 18 AWG
LENGTHS<2000 FEET - 16 AWG
LENGTHS<4000 FEET - 14 AWG
3. HAND-HELD TERMINALS REQUIRE ADDITIONAL WIRES AS SHOWN TO SUPPLY +8 VOLTS AND GND. THESE SHOULD BE CONNECTED TO A GAUGE WHICH WILL REMAIN POWERED AT ALL TIMES WHEN SYSTEM IS IN USE AS ALL COMMUNICATIONS WILL BE LOST WHEN THE GAUGE SUPPLYING THE +8 VOLTS IS TURNED OFF. ALL OTHER GAUGES MAY BE TURNED ON AND OFF AS DESIRED WITHOUT AFFECTING THE SYSTEM COMMUNICATIONS STATUS. DO NOT MAKE CONNECTIONS TO THE +8 VOLT TERMINAL ON THE OTHER GAUGES IN THE SYSTEM, OR ATTEMPT TO PARALLEL THE +8 VOLT TERMINALS AS DAMAGE MAY RESULT.
4. GAUGE TERMINAL BLOCKS ARE DESIGNED TO ACCEPT ONLY 1 WIRE PER TERMINAL. MULTIPLE WIRES, TERMINATION RESISTORS, ETC MUST BE CONNECTED SEPARATELY.
5. CLASS II WIRING ACCEPTABLE. MAXIMUM VOLTAGE ON COMMUNICATIONS BUSS IS 10 VOLTS.
6. COMMUNICATIONS BUSS TO BE TERMINATED AT EACH END AS SHOWN WITH 120 OHM 1/4 WATT RESISTORS. A TOTAL OF TWO RESISTORS IS REQUIRED.
7. FOR DETAILS REGARDING GAUGE COMMUNICATIONS, SEE MANUAL.
8. SHIELD GND OPTIONAL FOR RS-485 TO RS232 CONVERTER.
GAUGE
REFER TO THE APPROPRIATE SYSTEM LEVEL WIRING DRAWING FOR PINOUTS
+DATA
-DATA
+8V OUT
GND
REMOVABLE CONNECTOR PROVIDED WITH CONVERTER
DATA+
DATA-
GND
+
-
TO POWER SUPPLY P/N 670046
DB9F
20
11
(RS-485)
DATA+ 1
DATA-
(V)+ve
Bgnd 10
THERMO FISHER RS485 CONVERTER P/N 670045
TO PC SERIAL COM PORT 1 OR 2 VIA CABLE P/N 810141
RJ-11 CONN.
NC
+8V
+DATA
-DATA
GND
NC
HHT
STANDARD AT&T RJ-11 TELEPHONE JACK 6 WIDE 4 CONDUCTOR
SEE NOTE 3
DATA+
DATA-
GND
+8 VOLTS
THREE UNITS SHOWN FOR CLARITY.
SEE NOTE 2
DATA+
DATA-
GND
TERMINATION RESISTOR 120 OHMS
SEE NOTE 8
+ DATA
- DATA
+8V OUT
GND
SEE NOTE 3
UNIT 1 COMM MODULE
UNIT N-1 COMM MODULE
UNIT N COMM MODULE
WIRING (SEE NOTE 2)
THERMO FISHER SUPPLIED
CUSTOMER SUPPLIED
ALL UNITS ARE CONNECTED IN PARALLEL. 32 UNITS MAXIMUM.
120 ohms Termination Resistor

Figure C–4. 868519: RS485 installation & wiring (sheet 1 of 1)

NOTES:

1. FIGURE 1 SHOWS THE ADDITIONAL WIRING REQUIRED TO CASCADE TWO (2) OR MORE DETECTORS.
2. AC AND/OR DC POWER MUST BE APPLIED TO ALL DETECTORS PER DRAWING NO. 868503.
3. THE SAFETY GND MUST BE CONNECTED TO ALL DETECTORS PER DRAWING NO. 868503.
4. DETECTOR #1 CONTROLS THE OPERATION OF THE OTHER DETECTORS. ANY ADDITIONAL WIRING; SUCH AS: RS232/RS485 COMMUNICATION OR 4–20ma OUTPUT NEEDS TO BE WIRED TO DETECTOR #1 PER DRAWING NO. 868503.

Figure C–5. 868529: Multiple detectors cascade wiring, Models 9742/4/6 (sheet 1 of 1)

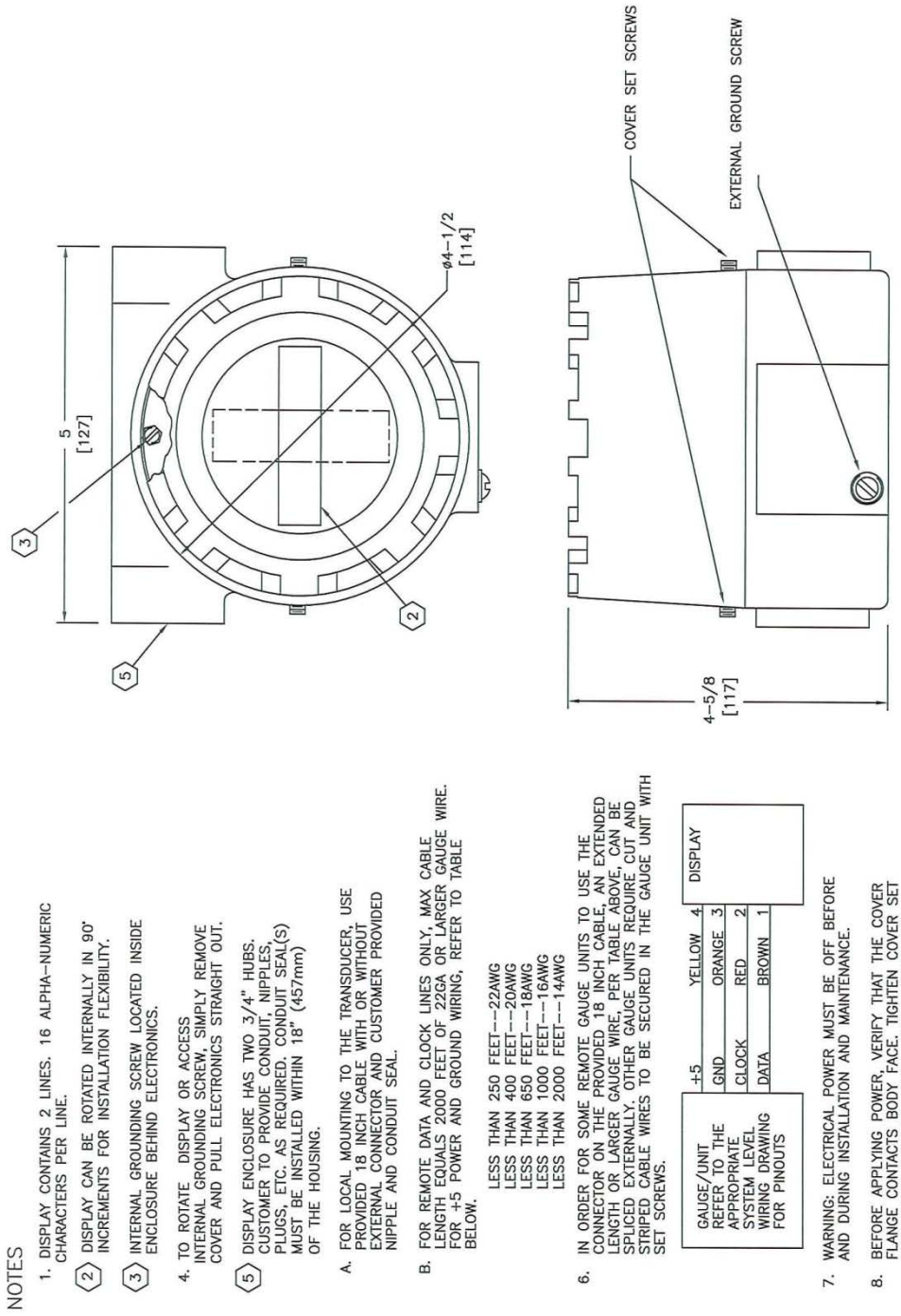

NOTES
1. DISPLAY CONTAINS 2 LINES. 16 ALPHA–NUMERIC CHARACTERS PER LINE.
2 DISPLAY CAN BE ROTATED INTERNALLY IN 90° INCREMENTS FOR INSTALLATION FLEXIBILITY.
3 INTERNAL GROUNDING SCREW LOCATED INSIDE ENCLOSURE BEHIND ELECTRONICS.
4. TO ROTATE DISPLAY OR ACCESS INTERNAL GROUNDING SCREW, SIMPLY REMOVE COVER AND PULL ELECTRONICS STRAIGHT OUT.
5 DISPLAY ENCLOSURE HAS TWO 3/4" HUBS. CUSTOMER TO PROVIDE CONDUIT, NIPPLES, PLUGS, ETC. AS REQUIRED. CONDUIT SEAL(S) MUST BE INSTALLED WITHIN 18" (457mm) OF THE HOUSING.
A. FOR LOCAL MOUNTING TO THE TRANSDUCER, USE PROVIDED 18 INCH CABLE WITH OR WITHOUT EXTERNAL CONNECTOR AND CUSTOMER PROVIDED NIPPLE AND CONDUIT SEAL.
B. FOR REMOTE DATA AND CLOCK LINES ONLY, MAX CABLE LENGTH EQUALS 2000 FEET OF 22GA OR LARGER GAUGE WIRE. FOR +5 POWER AND GROUND WIRING, REFER TO TABLE BELOW.
LESS THAN 250 FEET---22AWG
LESS THAN 400 FEET---20AWG
LESS THAN 650 FEET---18AWG
LESS THAN 1000 FEET---16AWG
LESS THAN 2000 FEET---14AWG
6. IN ORDER FOR SOME REMOTE GAUGE UNITS TO USE THE CONNECTOR ON THE PROVIDED 18 INCH CABLE, AN EXTENDED LENGTH OR LARGER GAUGE WIRE, PER TABLE ABOVE, CAN BE SPLICED EXTERNALLY. OTHER GAUGE UNITS REQUIRE CUT AND STRIPED CABLE WIRES TO BE SECURED IN THE GAUGE UNIT WITH SET SCREWS.
GAUGE/UNIT REFER TO THE APPROPRIATE SYSTEM LEVEL WIRING DRAWING FOR PINOUTS
+5 YELLOW 4
GND ORANGE 3
CLOCK RED 2
DATA BROWN 1
DISPLAY
7. WARNING: ELECTRICAL POWER MUST BE OFF BEFORE AND DURING INSTALLATION AND MAINTENANCE.
8. BEFORE APPLYING POWER, VERIFY THAT THE COVER FLANGE CONTACTS BODY FACE. TIGHTEN COVER SET SCREWS TO PREVENT COVER FROM LOOSENING UNDER VIBRATION.
5 [127]
ø4–1/2 [114]
COVER SET SCREWS
EXTERNAL GROUND SCREW
4–5/8 [117]

Figure C–6. 867627: Installation drawing – Local / remote display, Model 9723 – CSA (sheet 1 of 1)

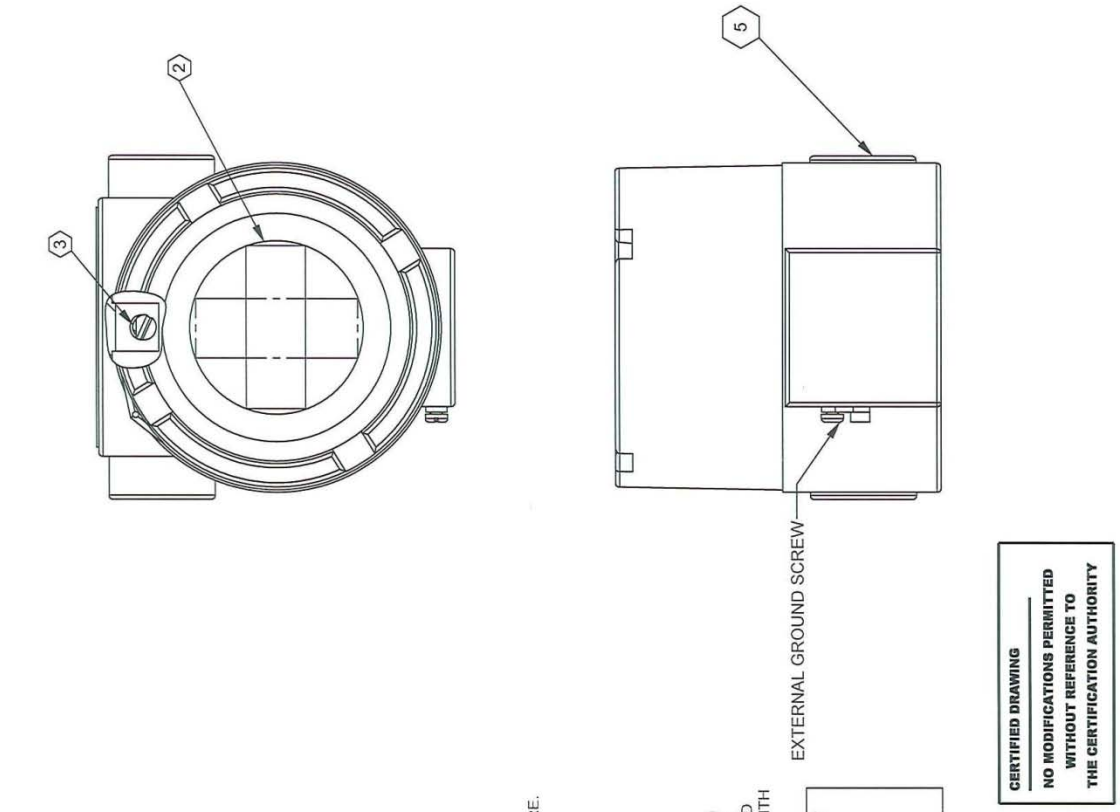

NOTES
1. DISPLAY CONTAINS 2 LINES. 16 ALPHA-NUMERIC CHARACTERS PER LINE.
2 DISPLAY CAN BE ROTATED INTERNALLY IN 90° INCREMENTS FOR INSTALLATION FLEXIBILITY.
3 INTERNAL GROUNDING SCREW LOCATED INSIDE ENCLOSURE BEHIND ELECTRONICS.
4. TO ROTATE DISPLAY OR ACCESS INTERNAL GROUNDING SCREW, SIMPLY REMOVE COVER AND PULL ELECTRONICS STRAIGHT OUT.
5 DISPLAY ENCLOSURE HAS TWO 3/4" HUBS. CUSTOMER TO PROVIDE CONDUIT, NIPPLES, PLUGS, ETC. AS REQUIRED. USE ONLY CERTIFIED Ex d CABLE GLANDS AT ENCLOSURE WALL. BLOCK ANY UNUSED ENTRIES WITH CERTIFIED Ex d THREADED PLUGS.
A. FOR LOCAL MOUNTING TO THE TRANSDUCER, USE PROVIDED 18 INCH CABLE WITH OR WITHOUT EXTERNAL CONNECTOR AND CUSTOMER PROVIDED NIPPLE AND CONDUIT SEAL.
B. FOR REMOTE DATA AND CLOCK LINES ONLY, MAX CABLE LENGTH EQUALS 2000 FEET OF 22GA OR LARGER GAUGE WIRE. FOR +5 POWER AND GROUND WIRING, REFER TO TABLE BELOW.
LESS THAN 250 FEET--22AWG
LESS THAN 400 FEET--20AWG
LESS THAN 650 FEET--18AWG
LESS THAN 1000 FEET--16AWG
LESS THAN 2000 FEET--14AWG
6. IN ORDER FOR SOME REMOTE GAUGE UNITS TO USE THE CONNECTOR ON THE PROVIDED 18 INCH CABLE, AN EXTENDED LENGTH OR LARGER GAUGE WIRE, PER TABLE ABOVE, CAN BE SPLICED EXTERNALLY. OTHER GAUGE UNITS REQUIRE CUT AND STRIPED CABLE WIRES TO BE SECURED IN THE GAUGE UNIT WITH SET SCREWS.
GAUGE/UNIT REFER TO THE APPROPRIATE SYSTEM LEVEL WIRING DRAWING FOR PINOUTS
+5 YELLOW 4
GND ORANGE 3
CLOCK RED 2
DATA BROWN 1
DISPLAY
7. WARNING: ELECTRICAL POWER MUST BE OFF BEFORE AND DURING INSTALLATION AND MAINTENANCE.
8. BEFORE APPLYING POWER, VERIFY THAT THE COVER FLANGE CONTACTS BODY FACE. TIGHTEN COVER SET SCREWS TO PREVENT COVER FROM LOOSENING UNDER VIBRATION.
EXTERNAL GROUND SCREW
CERTIFIED DRAWING
NO MODIFICATIONS PERMITTED WITHOUT REFERENCE TO THE CERTIFICATION AUTHORITY

Figure C–7. 867680: Installation drawing – Local / remote display, Model 9723 – ATEX, CSA (sheet 1 of 1)

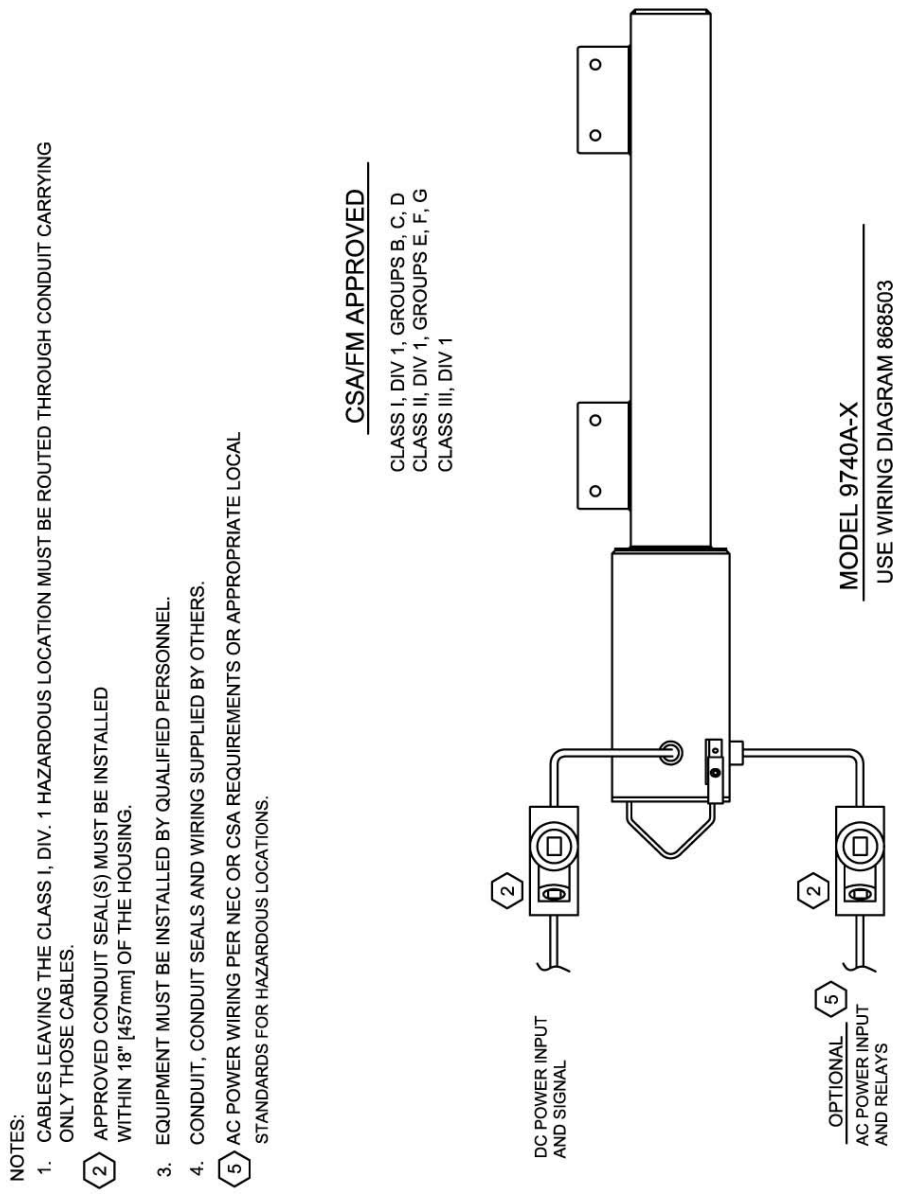
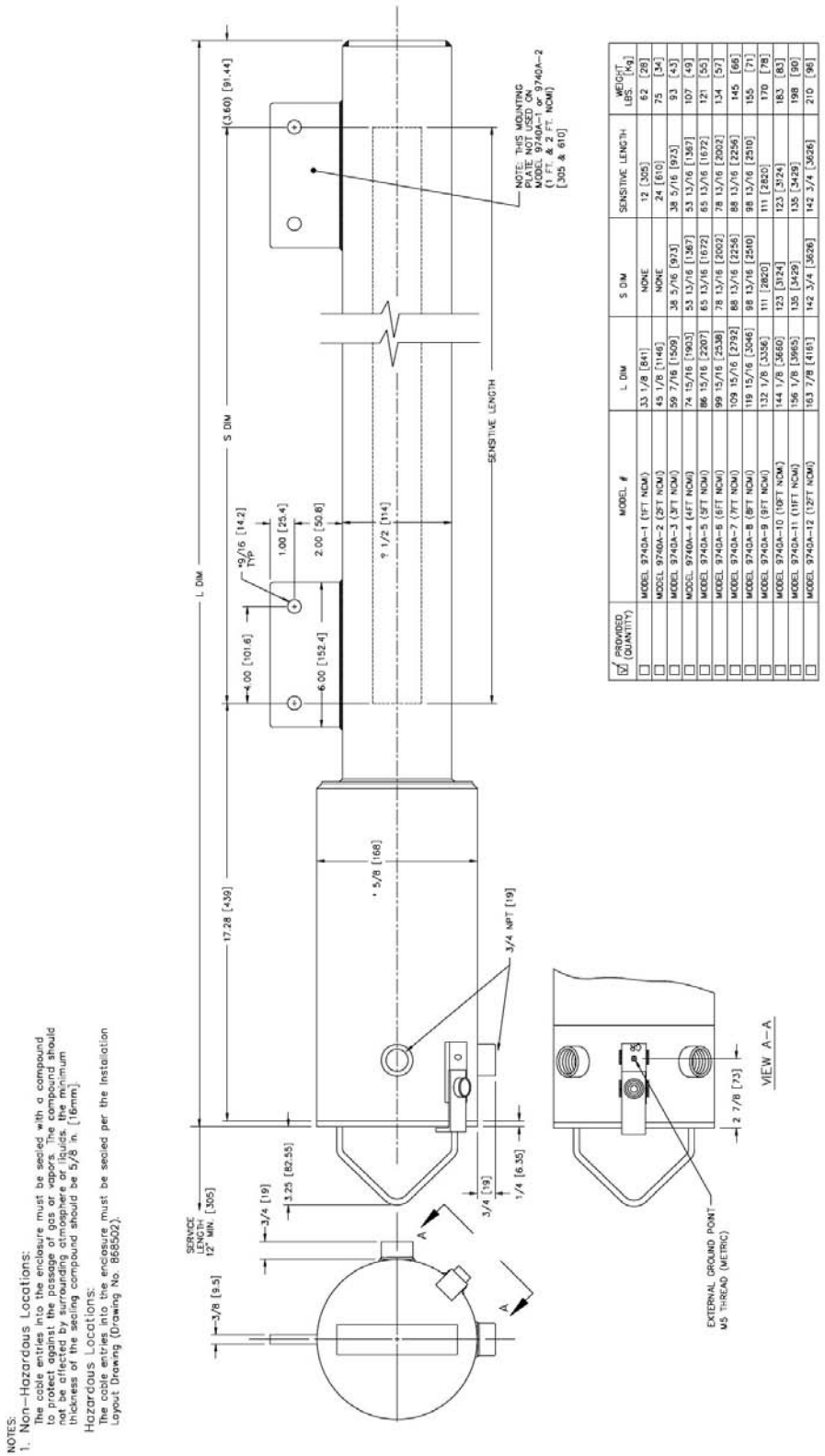
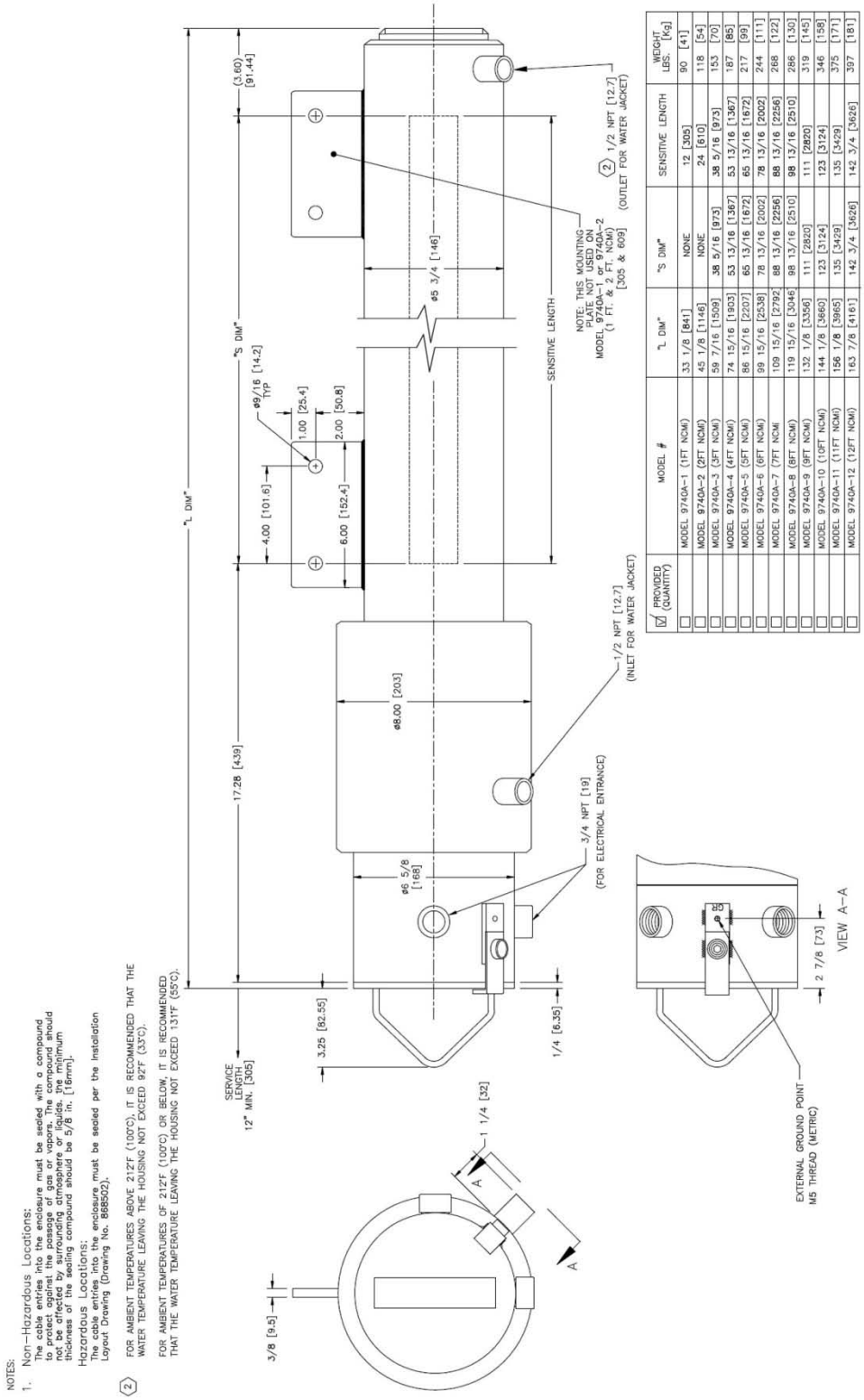

NOTES:
1. CABLES LEAVING THE CLASS I, DIV. 1 HAZARDOUS LOCATION MUST BE ROUTED THROUGH CONDUIT CARRYING ONLY THOSE CABLES.
2 APPROVED CONDUIT SEAL(S) MUST BE INSTALLED WITHIN 18" [457mm] OF THE HOUSING.
3. EQUIPMENT MUST BE INSTALLED BY QUALIFIED PERSONNEL.
4. CONDUIT, CONDUIT SEALS AND WIRING SUPPLIED BY OTHERS.
5 AC POWER WIRING PER NEC OR CSA REQUIREMENTS OR APPROPRIATE LOCAL STANDARDS FOR HAZARDOUS LOCATIONS.
CSA/FM APPROVED
CLASS I, DIV 1, GROUPS B, C, D
CLASS II, DIV 1, GROUPS E, F, G
CLASS III, DIV 1
MODEL 9740A-X
USE WIRING DIAGRAM 868503
2
2
DC POWER INPUT AND SIGNAL
OPTIONAL 5
AC POWER INPUT AND RELAYS

Figure C–8. 868502: Installation layout – LevelPRO Model 9740A-X (sheet 1 of 1)


NOTES:
1. Non-Hazardous Locations:
The cable entries into the enclosure must be sealed with a compound to protect against the passage of gas or vapors. The compound should not be affected by surrounding atmosphere or liquids. the minimum thickness of the sealing compound should be 5/8 in. (16mm).
Hazardous Locations:
The cable entries into the enclosure must be sealed per the Installation Layout Drawing (Drawing No. 868502).
L DIM
S DIM
SENSITIVE LENGTH
(360) [91.44]
17.28 [439]
4.00 [101.6]
6.00 [152.4]
1.00 [25.4]
2.00 [50.8]
9/16 [14.2] TYP
? 1/2 [114]
5/8 [168]
3/4 NPT [19]
3/4 [19]
1.25 [82.55]
3/8 [9.5]
SERVICE LOOP LENGTH 12" MIN. [305]
1/4 [6.35]
3/4 [19]
NOTE: THIS MOUNTING PLATE NOT USED ON MODEL 9740A-1 or 9740A-2 (1 FT. & 2 FT. NOM) [305 & 610]
VIEW A-A
2 7/8 [73]
EXTERNAL GROUND POINT M5 THREAD (METRIC)

☑ PROVIDED (QUANTITY)	MODEL #	L DIM	S DIM	SENSITIVE LENGTH	WEIGHT LBS. [Kg]
☐	MODEL 9740A-1 (1FT NOM)	33 1/8 [841]	NONE	12 [305]	62 [28]
☐	MODEL 9740A-2 (2FT NOM)	45 1/8 [1146]	NONE	24 [610]	75 [34]
☐	MODEL 9740A-3 (3FT NOM)	59 7/16 [1509]	38 5/16 [973]	38 5/16 [973]	93 [43]
☐	MODEL 9740A-4 (4FT NOM)	74 15/16 [1903]	53 13/16 [1367]	53 13/16 [1367]	107 [49]
☐	MODEL 9740A-5 (5FT NOM)	86 15/16 [2207]	65 13/16 [1672]	65 13/16 [1672]	121 [55]
☐	MODEL 9740A-6 (6FT NOM)	99 15/16 [2538]	78 13/16 [2002]	78 13/16 [2002]	134 [57]
☐	MODEL 9740A-7 (7FT NOM)	109 15/16 [2792]	88 13/16 [2256]	88 13/16 [2256]	145 [66]
☐	MODEL 9740A-8 (8FT NOM)	119 15/16 [3046]	98 13/16 [2510]	98 13/16 [2510]	155 [71]
☐	MODEL 9740A-9 (9FT NOM)	132 1/8 [3356]	111 [2820]	111 [2820]	170 [78]
☐	MODEL 9740A-10 (10FT NOM)	144 1/8 [3660]	123 [3124]	123 [3124]	183 [83]
☐	MODEL 9740A-11 (11FT NOM)	156 1/8 [3965]	135 [3429]	135 [3429]	198 [90]
☐	MODEL 9740A-12 (12FT NOM)	163 7/8 [4161]	142 3/4 [3626]	142 3/4 [3626]	210 [96]

Figure C–9. 868672: Mounting dimensions – LevelPRO Model 9740A-X (sheet 1 of 1)


NOTES:
1. Non-Hazardous Locations:
The cable entries into the enclosure must be sealed with a compound to protect against the passage of gas or vapors. The compound should not be affected by surrounding atmosphere or liquids. The minimum thickness of the sealing compound should be 3/8 in. [10mm].
Hazardous Locations:
The cable entries into the enclosure must be sealed per the Installation Layout Drawing (Drawing No. 868502).
2. FOR AMBIENT TEMPERATURES ABOVE 212°F (100°C), IT IS RECOMMENDED THAT THE WATER TEMPERATURE LEAVING THE HOUSING NOT EXCEED 92°F (33°C).
FOR AMBIENT TEMPERATURES OF 212°F (100°C) OR BELOW, IT IS RECOMMENDED THAT THE WATER TEMPERATURE LEAVING THE HOUSING NOT EXCEED 131°F (55°C).
"L" DIM"
17.28 [439]
SERVICE LENGTH 12" MIN. [305]
3.25 [82.55]
1/4 [6.35]
"S" DIM"
ø9/16 TYP [14.2]
1.00 [25.4]
2.00 [50.8]
4.00 [101.6]
6.00 [152.4]
ø8.00 [203]
ø6 5/8 [168]
3/4 NPT [19] (FOR ELECTRICAL ENTRANCE)
1/2 NPT [12.7] (INLET FOR WATER JACKET)
(3.60) [91.44]
ø5 3/4 [146]
SENSITIVE LENGTH
NOTE: THIS MOUNTING PLATE NOT USED ON MODEL 9740A-2 (1 FT. & 2 FT. NCM)
[305 & 609]
2 1/2 NPT [12.7] (OUTLET FOR WATER JACKET)
1 1/4 [32]
3/8 [9.5]
A
A
VIEW A-A
2 7/8 [73]
EXTERNAL GROUND POINT M5 THREAD (METRIC)

☑ PROVIDED (QUANTITY)	MODEL #	"L" DIM"	"S" DIM"	SENSITIVE LENGTH	WEIGHT LBS. [Kg]
☐	MODEL 9740A-1 (1FT NCM)	33 1/8 [841]	NONE	12 [305]	90 [41]
☐	MODEL 9740A-2 (2FT NCM)	45 1/8 [1146]	NONE	24 [610]	118 [54]
☐	MODEL 9740A-3 (3FT NCM)	59 7/16 [1509]	38 5/16 [973]	38 5/16 [973]	153 [70]
☐	MODEL 9740A-4 (4FT NCM)	74 15/16 [1903]	53 13/16 [1367]	53 13/16 [1367]	187 [85]
☐	MODEL 9740A-5 (5FT NCM)	86 15/16 [2207]	65 13/16 [1672]	65 13/16 [1672]	217 [99]
☐	MODEL 9740A-6 (6FT NCM)	99 15/16 [2538]	78 13/16 [2002]	78 13/16 [2002]	244 [111]
☐	MODEL 9740A-7 (7FT NCM)	109 15/16 [2792]	88 13/16 [2256]	88 13/16 [2256]	268 [122]
☐	MODEL 9740A-8 (8FT NCM)	119 15/16 [3046]	98 13/16 [2510]	98 13/16 [2510]	286 [130]
☐	MODEL 9740A-9 (9FT NCM)	132 1/8 [3356]	111 [2820]	111 [2820]	319 [145]
☐	MODEL 9740A-10 (10FT NCM)	144 1/8 [3660]	123 [3124]	123 [3124]	346 [158]
☐	MODEL 9740A-11 (11FT NCM)	156 1/8 [3965]	135 [3429]	135 [3429]	375 [171]
☐	MODEL 9740A-12 (12FT NCM)	163 7/8 [4161]	142 3/4 [3626]	142 3/4 [3626]	397 [181]

Figure C–10. 868674: Mounting dimensions – LevelPRO water-cooled Model 9740A-X (sheet 1 of 1)

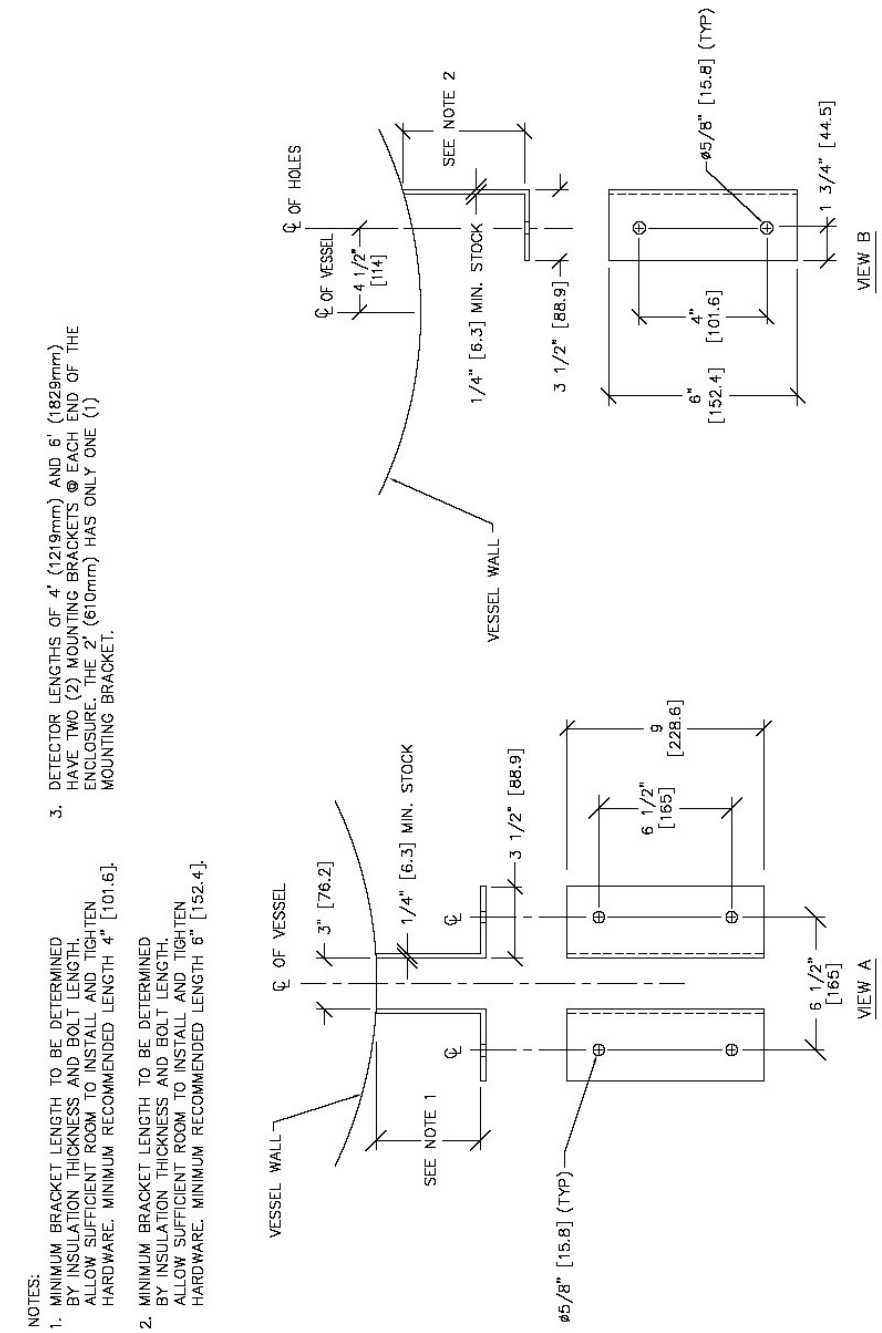

NOTES:
1. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 4" [101.6].
2. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 6" [152.4].
3. DETECTOR LENGTHS OF 4' (1219mm) AND 6' (1829mm) HAVE TWO (2) MOUNTING BRACKETS @ EACH END OF THE ENCLOSURE. THE 2' (610mm) HAS ONLY ONE (1) MOUNTING BRACKET.
℄ OF VESSEL
3" [76.2]
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
SEE NOTE 1
VESSEL WALL
Ø5/8" [15.8] (TYP)
6 1/2" [165]
9 [228.6]
VIEW A
℄ OF HOLES
4 1/2" [114]
SEE NOTE 2
Ø5/8" [15.8] (TYP)
1 3/4" [44.5]
4" [101.6]
6" [152.4]
VIEW B

Figure C–11. 868568: LevelPRO installation / arrangement drawing – 1 source with 1 detector (sheet 1 of 2)

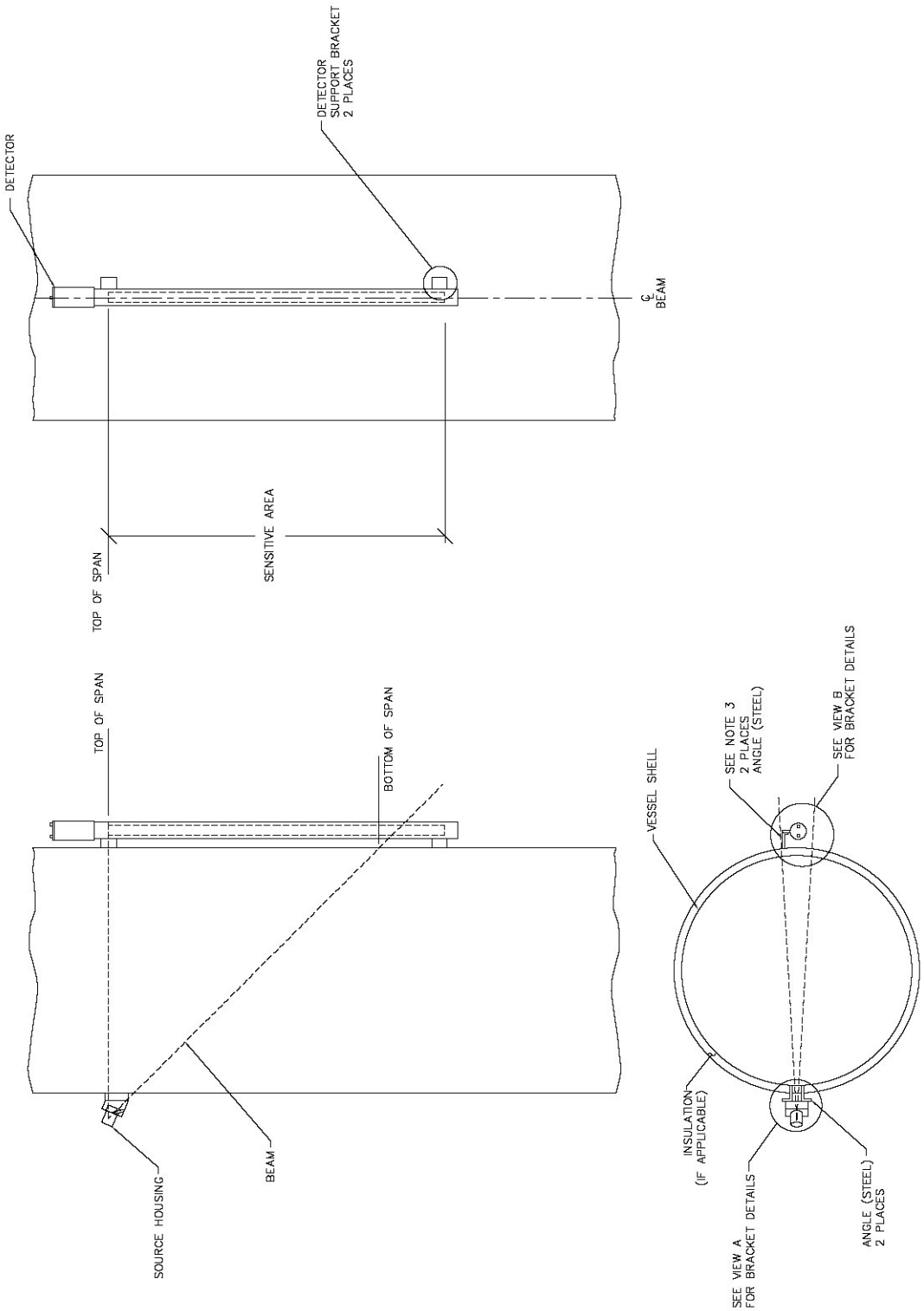


Figure C–12. 868568: LevelPRO installation / arrangement drawing – 1 source with 1 detector (sheet 2 of 2)

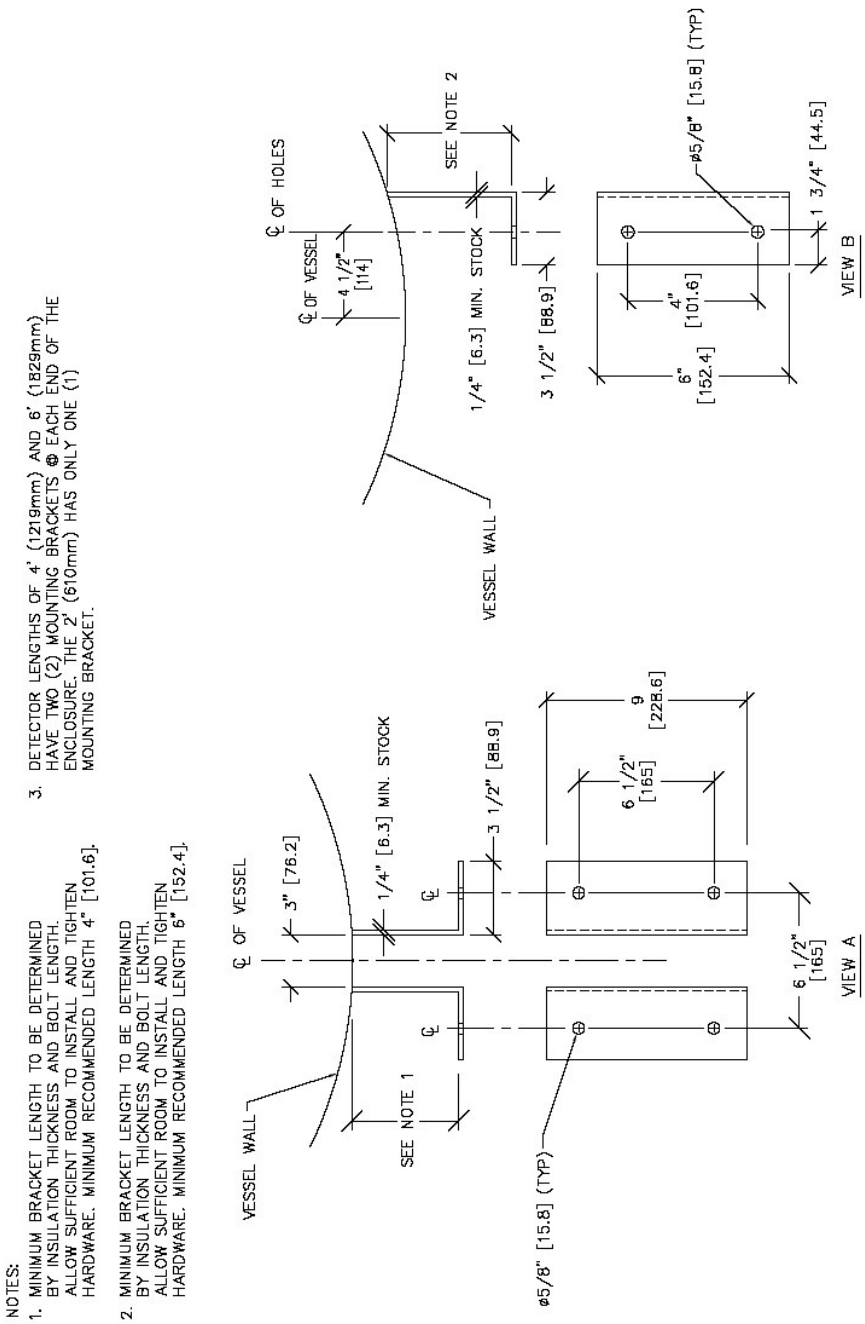

NOTES:
1. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 4" [101.6].
2. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 6" [152.4].
3. DETECTOR LENGTHS OF 4' (1219mm) AND 6' (1829mm) HAVE TWO (2) MOUNTING BRACKETS @ EACH END OF THE ENCLOSURE. THE 2' (610mm) HAS ONLY ONE (1) MOUNTING BRACKET.
℄ OF VESSEL
3" [76.2]
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
SEE NOTE 1
VESSEL WALL
ø5/8" [15.8] (TYP)
9 [228.6]
6 1/2" [165]
6 1/2" [165]
VIEW A
℄ OF HOLES
℄ OF VESSEL
4 1/2" [114]
SEE NOTE 2
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
VESSEL WALL
ø5/8" [15.8] (TYP)
6" [152.4]
4" [101.6]
1 3/4" [44.5]
VIEW B

Figure C–13. 868569: LevelPRO installation / arrangement drawing – 2 sources with 1 detector (sheet 1 of 2)

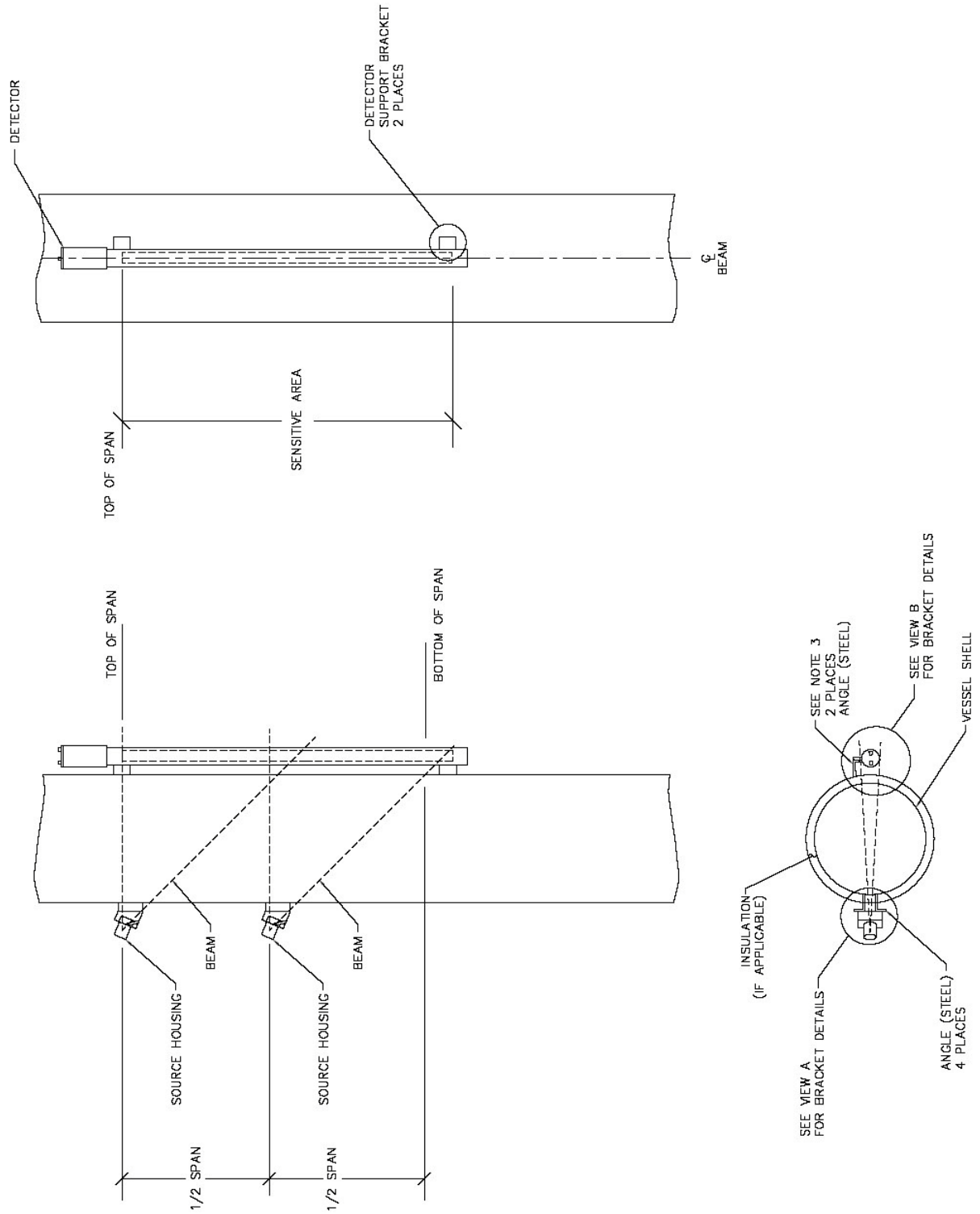


Figure C–14. 868569: LevelPRO installation / arrangement drawing – 2 sources with 1 detector (sheet 2 of 2)

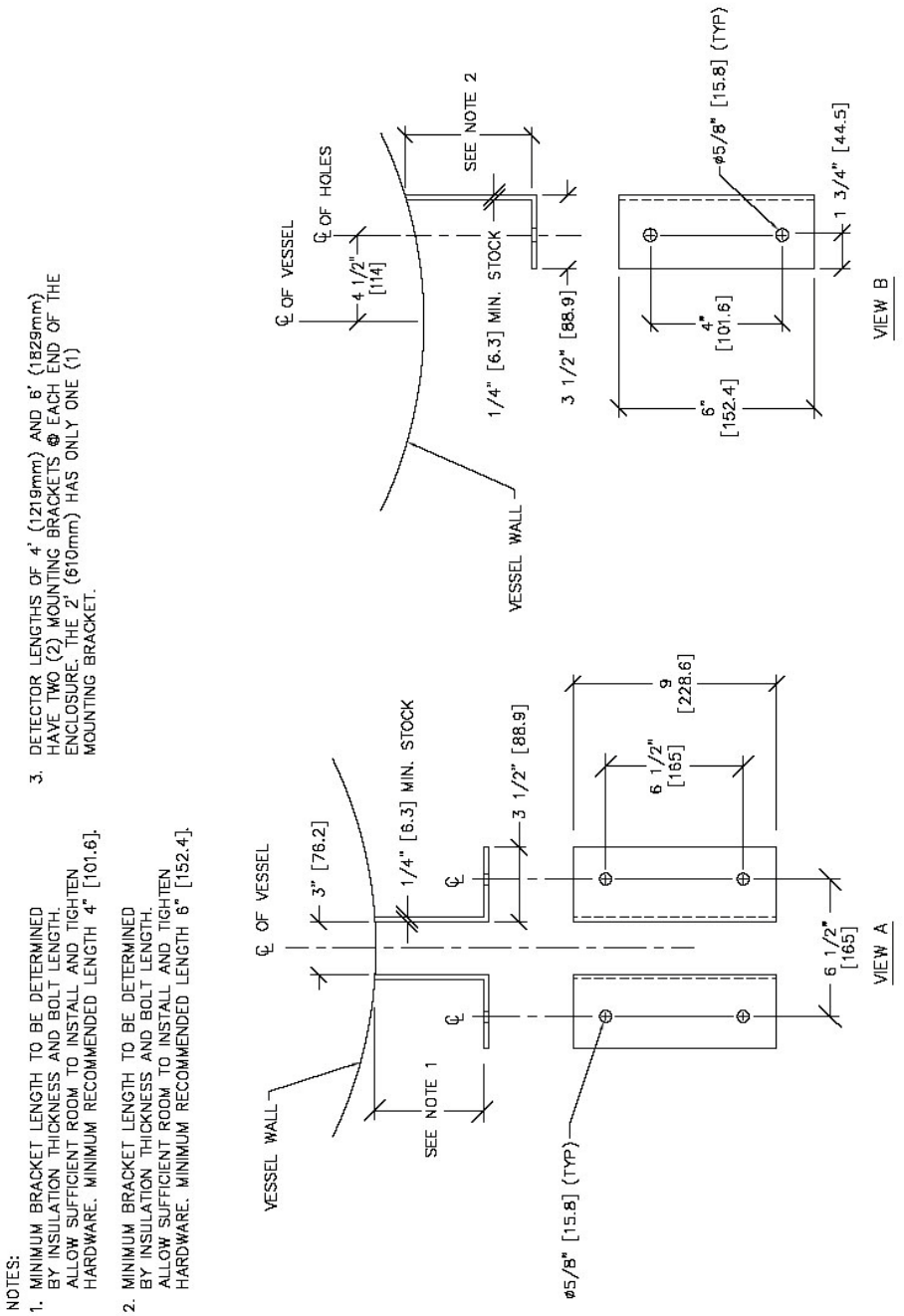

NOTES:
1. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 4" [101.6].
2. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 6" [152.4].
3. DETECTOR LENGTHS OF 4' (1219mm) AND 6' (1829mm) HAVE TWO (2) MOUNTING BRACKETS @ EACH END OF THE ENCLOSURE. THE 2' (610mm) HAS ONLY ONE (1) MOUNTING BRACKET.
℄ OF VESSEL
3" [76.2]
1/4" [6.3] MIN. STOCK
℄
3 1/2" [88.9]
9 [228.6]
6 1/2" [165]
SEE NOTE 1
VESSEL WALL
ø5/8" [15.8] (TYP)
6 1/2" [165]
VIEW A
℄ OF VESSEL
℄ OF HOLES
4 1/2" [114]
SEE NOTE 2
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
VESSEL WALL
ø5/8" [15.8] (TYP)
1 3/4" [44.5]
4" [101.6]
6" [152.4]
VIEW B

Figure C–15. 868566: LevelPRO installation / arrangement drawing – 3 sources with 1 detector (sheet 1 of 2)

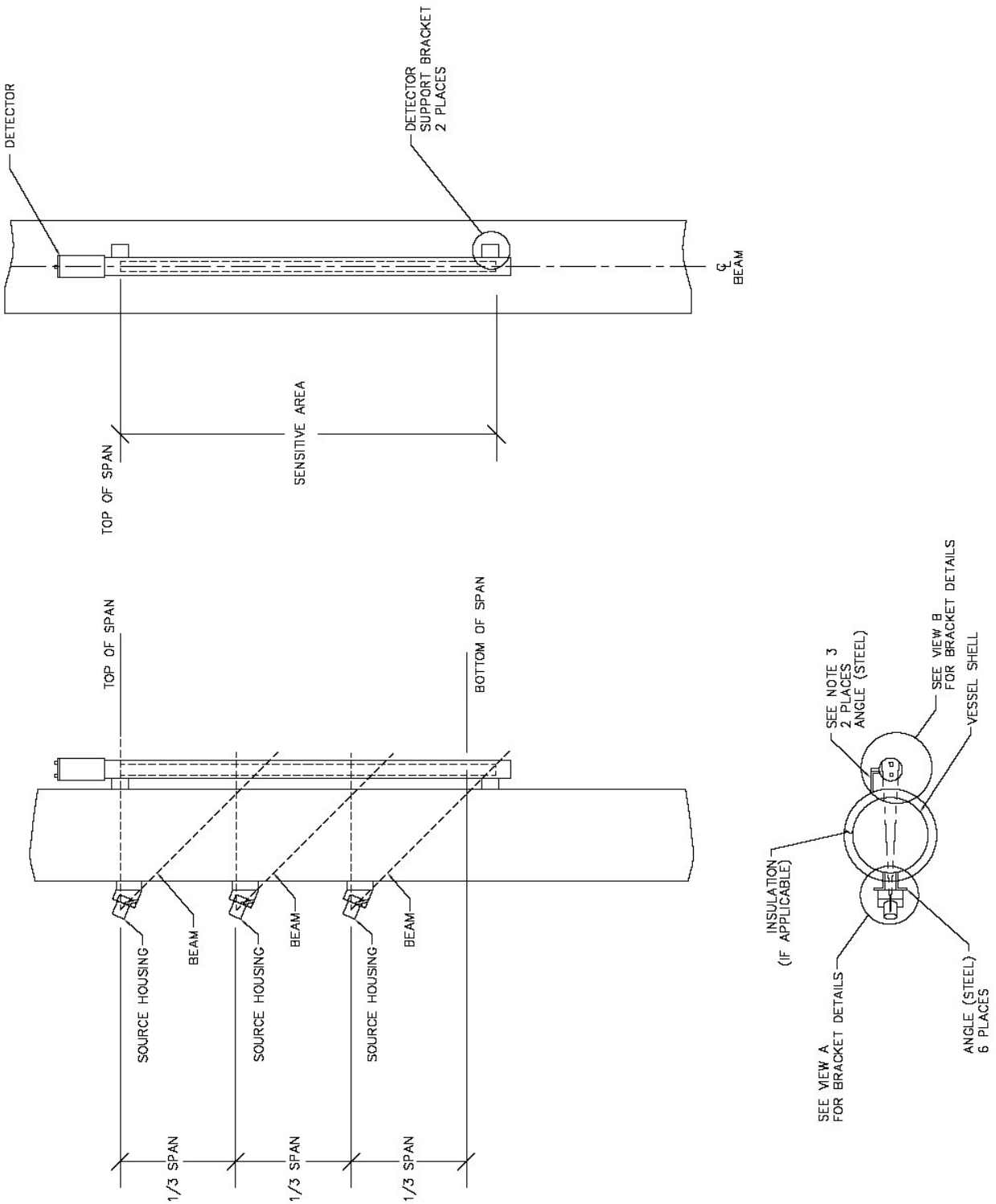


Figure C–16. 868566: LevelPRO installation / arrangement drawing – 3 sources with 1 detector (sheet 2 of 2)

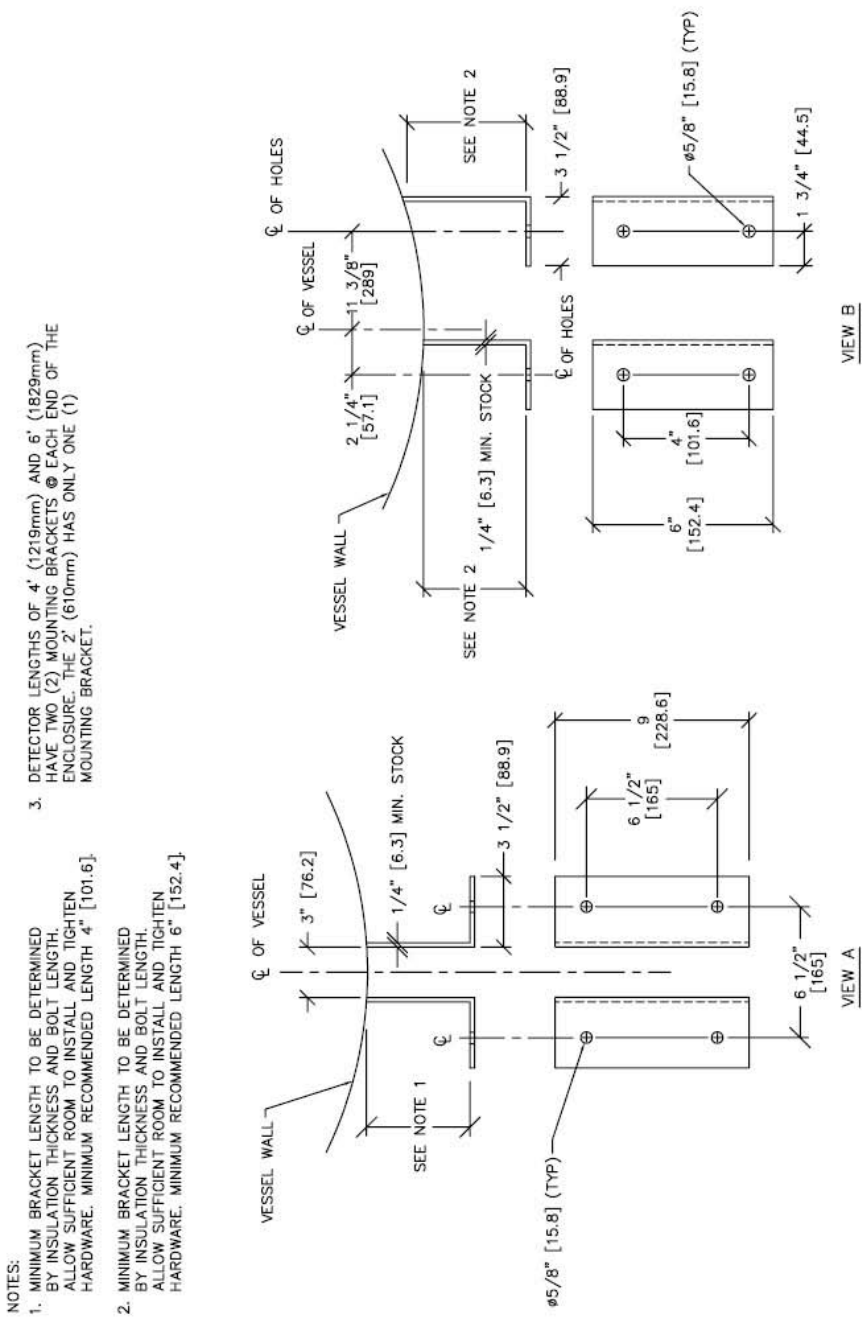

NOTES:
1. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 4" [101.6].
2. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 6" [152.4].
3. DETECTOR LENGTHS OF 4' (1219mm) AND 6' (1829mm) HAVE TWO (2) MOUNTING BRACKETS @ EACH END OF THE ENCLOSURE. THE 2' (610mm) HAS ONLY ONE (1) MOUNTING BRACKET.
℄ OF VESSEL
3" [76.2]
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
SEE NOTE 1
VESSEL WALL
Ø5/8" [15.8] (TYP)
9 [228.6]
6 1/2" [165]
6 1/2" [165]
VIEW A
℄ OF VESSEL
2 1/4" [57.1]
11 3/8" [289]
VESSEL WALL
SEE NOTE 2
1/4" [6.3] MIN. STOCK
SEE NOTE 2
℄ OF HOLES
3 1/2" [88.9]
℄ OF HOLES
4" [101.6]
6" [152.4]
Ø5/8" [15.8] (TYP)
1 3/4" [44.5]
VIEW B

Figure C–17. 868567: LevelPRO installation / arrangement drawing – 2 sources with 2 detectors (sheet 1 of 2)

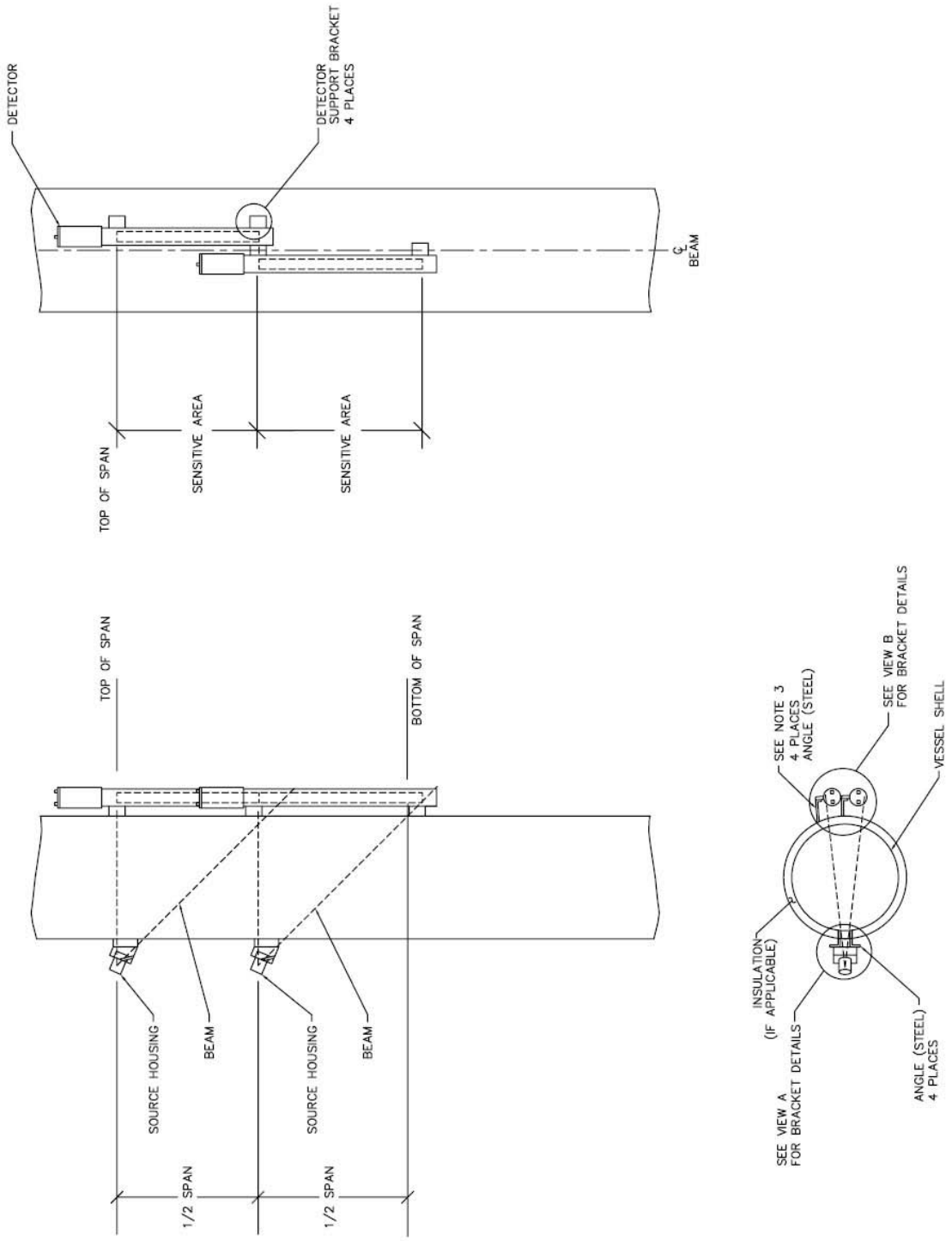


Figure C–18. 868567: LevelPRO installation / arrangement drawing – 2 sources with 2 detectors (sheet 2 of 2)

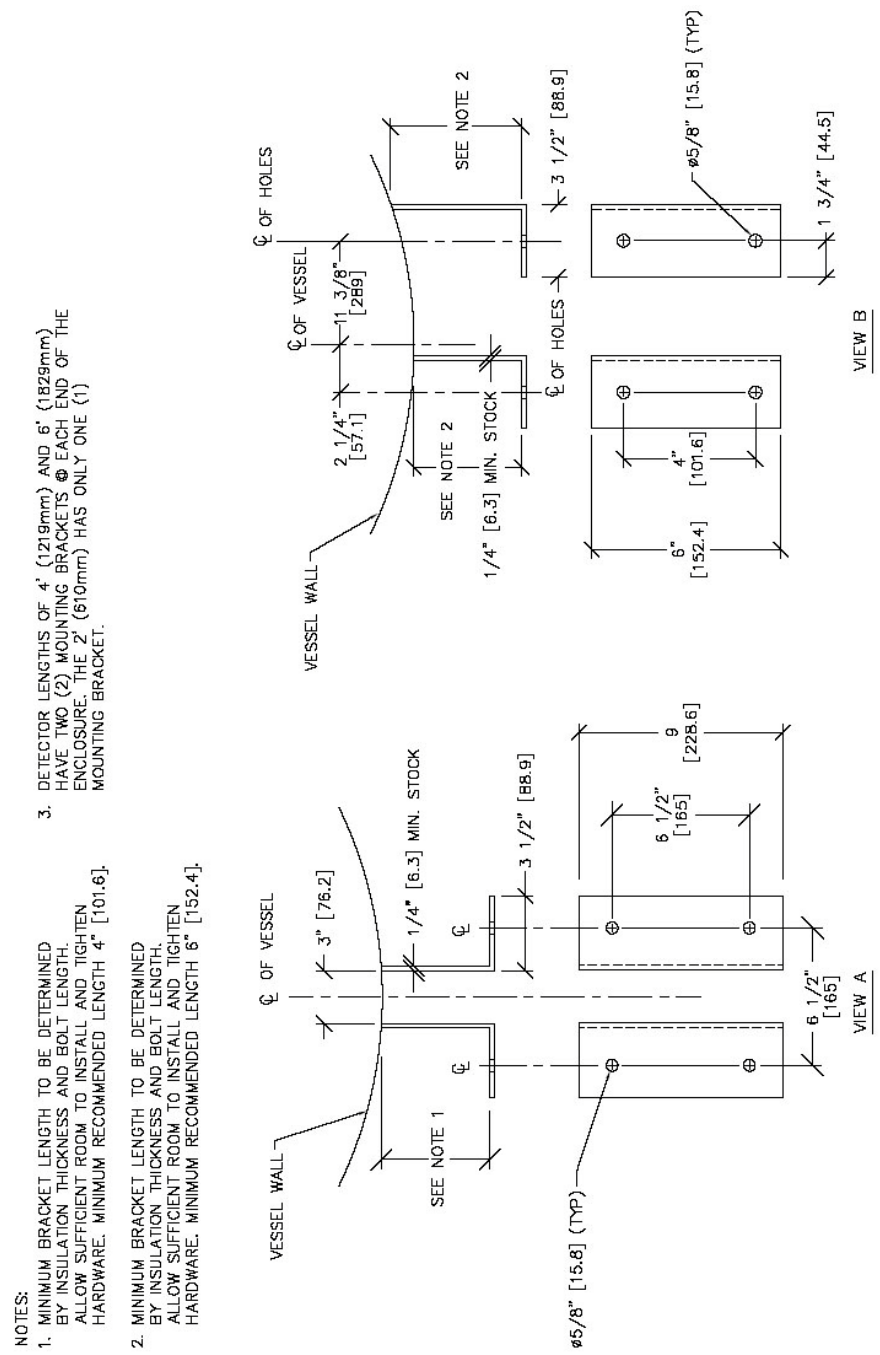

NOTES:
1. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 4" [101.6].
2. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 6" [152.4].
3. DETECTOR LENGTHS OF 4' (1219mm) AND 6' (1829mm) HAVE TWO (2) MOUNTING BRACKETS @ EACH END OF THE ENCLOSURE. THE 2' (610mm) HAS ONLY ONE (1) MOUNTING BRACKET.
℄ OF VESSEL
3" [76.2]
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
SEE NOTE 1
VESSEL WALL
ø5/8" [15.8] (TYP)
6 1/2" [165]
9 [228.6]
VIEW A
℄ OF HOLES
11 3/8" [289]
2 1/4" [57.1]
SEE NOTE 2
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
4" [101.6]
6" [152.4]
ø5/8" [15.8] (TYP)
1 3/4" [44.5]
VIEW B

Figure C–19. 868570: LevelPRO installation / arrangement drawing – 2 sources with 3 detectors (sheet 1 of 2)

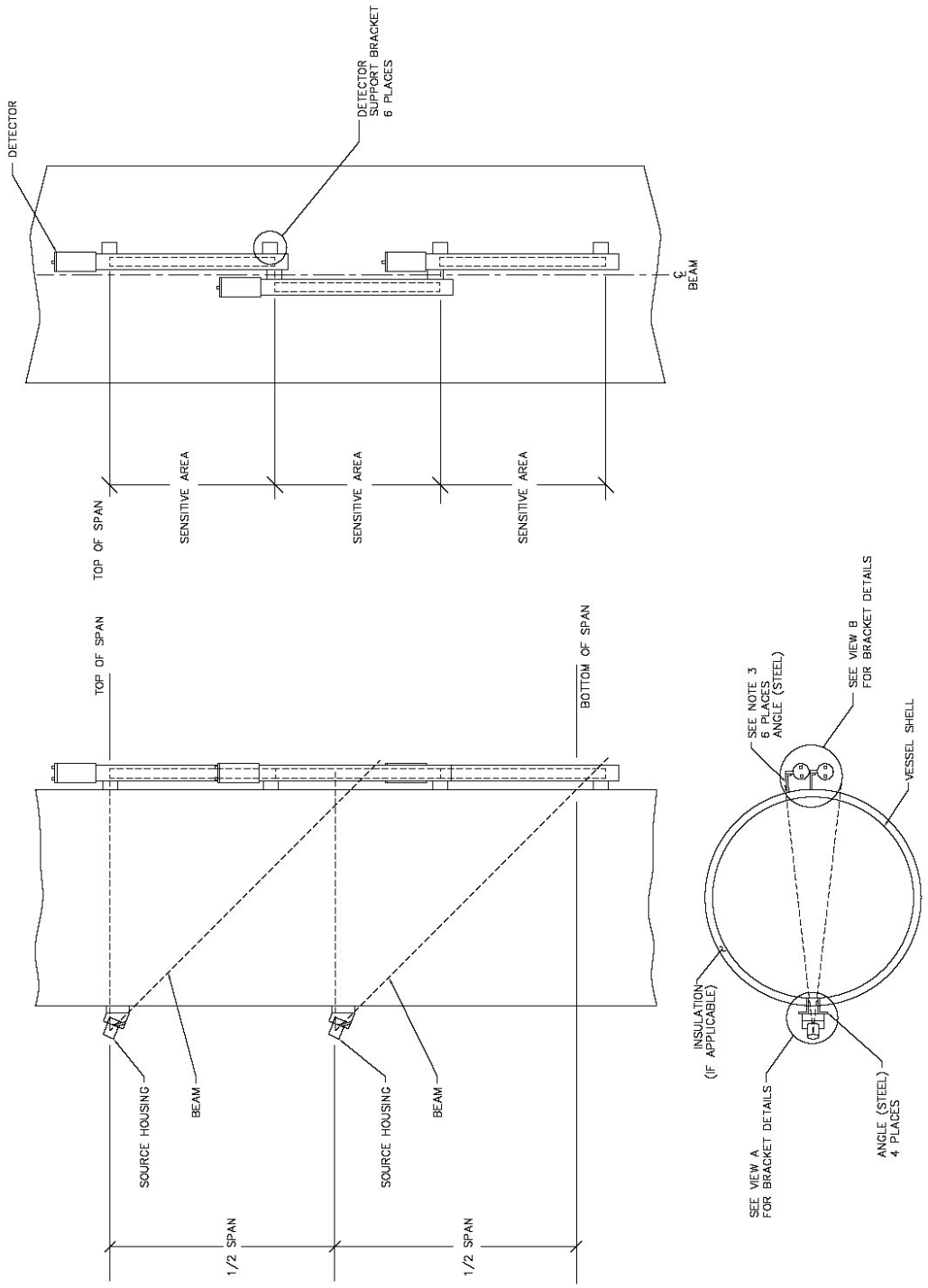


Figure C–20. 868570: LevelPRO installation / arrangement drawing – 2 sources with 3 detectors (sheet 2 of 2)

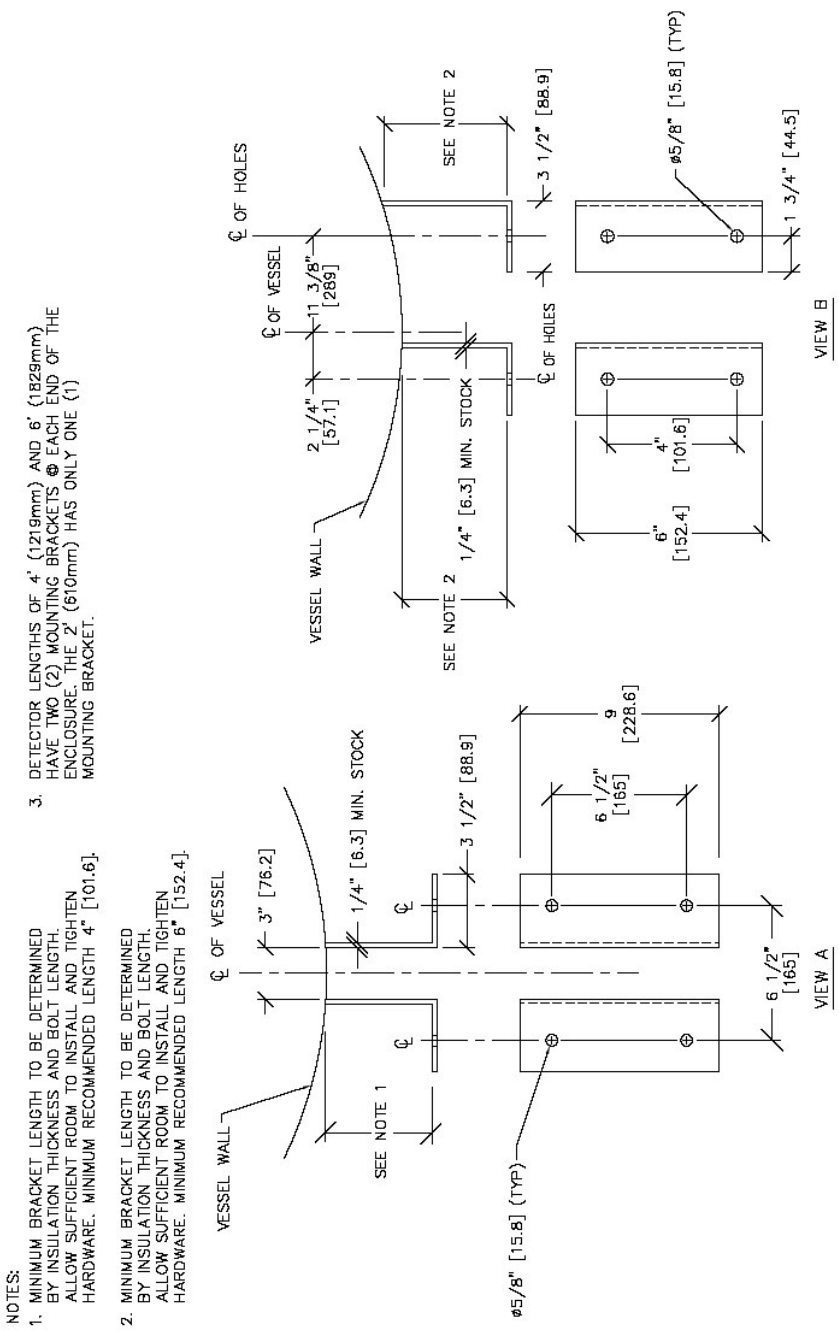

NOTES:
1. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 4" [101.6].
2. MINIMUM BRACKET LENGTH TO BE DETERMINED BY INSULATION THICKNESS AND BOLT LENGTH. ALLOW SUFFICIENT ROOM TO INSTALL AND TIGHTEN HARDWARE. MINIMUM RECOMMENDED LENGTH 6" [152.4].
3. DETECTOR LENGTHS OF 4' (1219mm) AND 6' (1829mm) HAVE TWO (2) MOUNTING BRACKETS @ EACH END OF THE ENCLOSURE. THE 2' (610mm) HAS ONLY ONE (1) MOUNTING BRACKET.
℄ OF VESSEL
3" [76.2]
1/4" [6.3] MIN. STOCK
3 1/2" [88.9]
VESSEL WALL
SEE NOTE 1
ø5/8" [15.8] (TYP)
9 [228.6]
6 1/2" [165]
6 1/2" [165]
VIEW A
℄ OF HOLES
℄ OF VESSEL
11 3/8" [289]
2 1/4" [57.1]
VESSEL WALL
SEE NOTE 2
1/4" [6.3] MIN. STOCK
SEE NOTE 2
3 1/2" [88.9]
ø5/8" [15.8] (TYP)
1 3/4" [44.5]
℄ OF HOLES
4" [101.6]
6" [152.4]
VIEW B

Figure C–21. 868571: LevelPRO installation / arrangement drawing – 3 sources with 2 detectors (sheet 1 of 2)

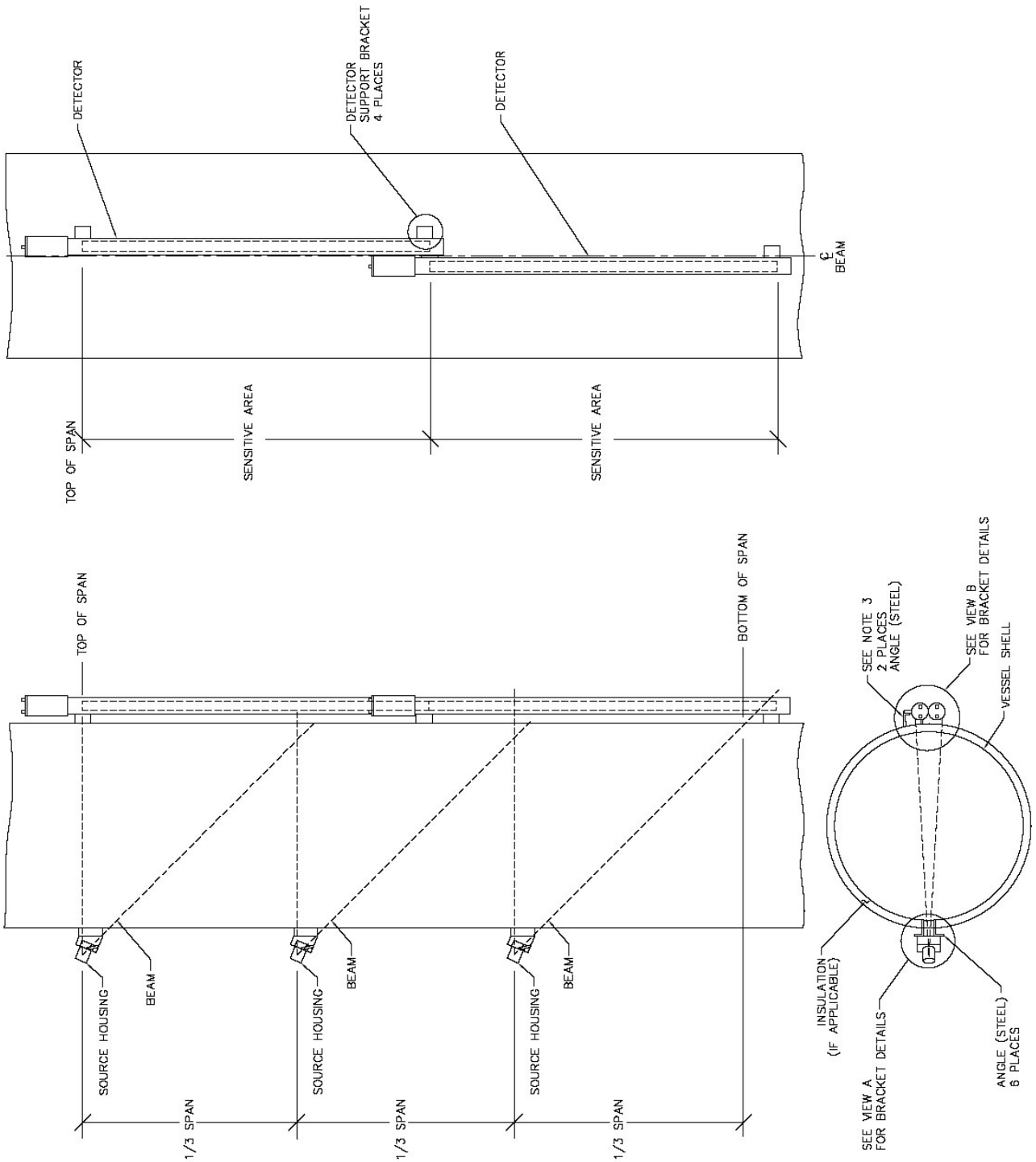


Figure C–22. 868571: LevelPRO installation / arrangement drawing – 3 sources with 2 detectors (sheet 2 of 2)

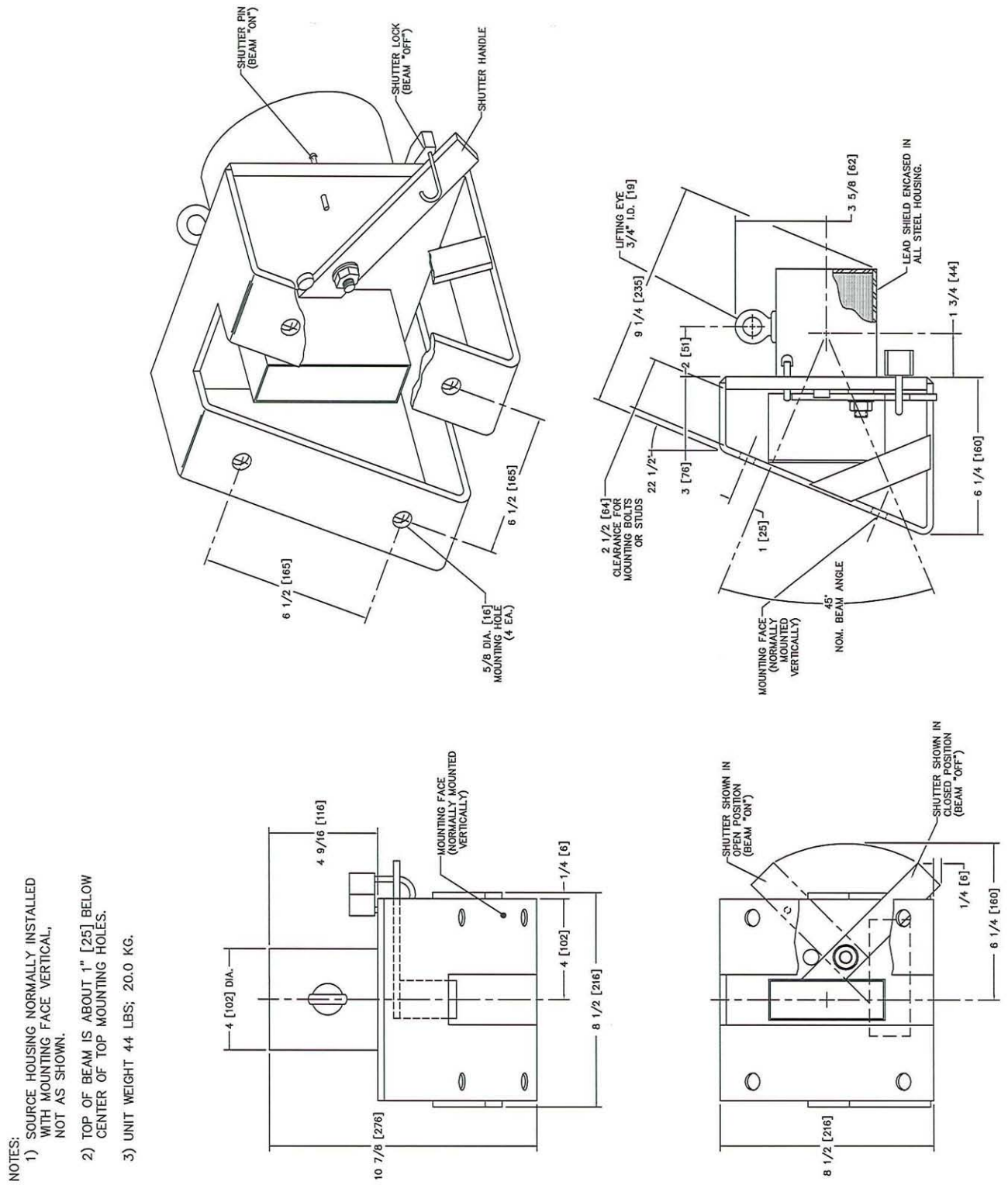

SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
6 1/2 [165]
6 1/2 [165]
5/8 DIA. [16] MOUNTING HOLE (4 EA.)
LIFTING EYE 3/4" I.D. [19]
9 1/4 [235]
3 5/8 [62]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING.
1 3/4 [44]
2 [51]
2 1/2 [64] CLEARANCE FOR MOUNTING BOLTS OR STUDS
22 1/2°
3 [76]
1 [25]
6 1/4 [160]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
45° NOM. BEAM ANGLE
4 9/16 [116]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
1/4 [6]
4 [102] DIA.
4 [102]
8 1/2 [216]
10 7/8 [276]
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
1/4 [6]
6 1/4 [160]
8 1/2 [216]
NOTES:
1) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
2) TOP OF BEAM IS ABOUT 1" [25] BELOW CENTER OF TOP MOUNTING HOLES.
3) UNIT WEIGHT 44 LBS; 20.0 KG.

Figure C–23. 865494: Mounting dimensions – Model 5205 / 5205A source housing, 100 mCi (sheet 1 of 1)

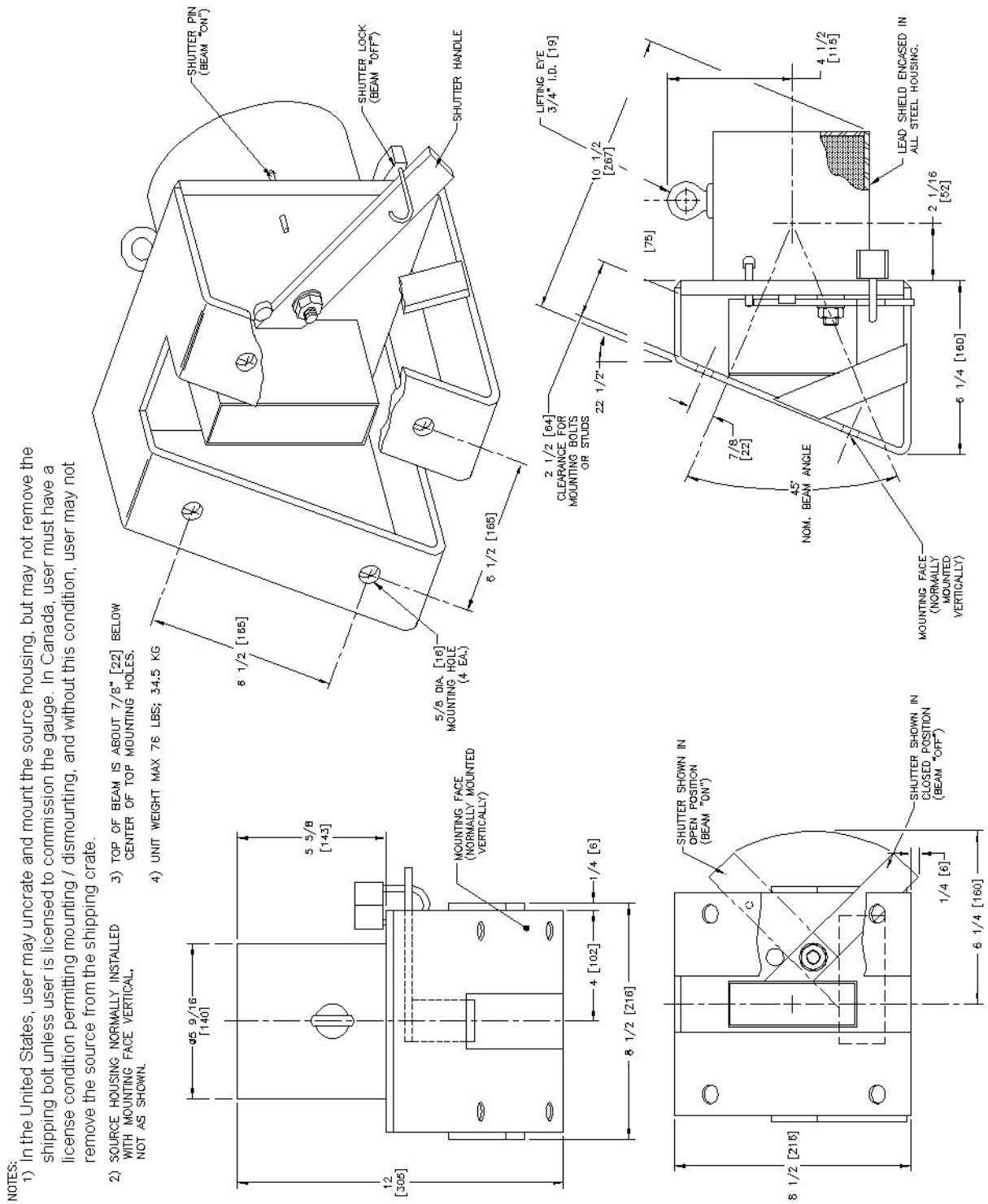

NOTES:
1) In the United States, user may uncrate and mount the source housing, but may not remove the shipping bolt unless user is licensed to commission the gauge. In Canada, user must have a license condition permitting mounting / dismounting, and without this condition, user may not remove the source from the shipping crate.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
3) TOP OF BEAM IS ABOUT 7/8" [22] BELOW CENTER OF TOP MOUNTING HOLES.
4) UNIT WEIGHT MAX 76 LBS; 34.5 KG
SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
LIFTING EYE 3/4" I.D. [19]
10 1/2 [267]
2 1/2 [64] CLEARANCE FOR MOUNTING BOLTS OR STUDS
22 1/2"
4 1/2 [115]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING.
2 1/16 [52]
[75]
6 1/4 [160]
7/8 [22]
45° NOM. BEAM ANGLE
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
8 1/2 [165]
8 1/2 [185]
5/8 DIA [16] MOUNTING HOLE (4 EA.)
5 5/8 [143]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
1/4 [6]
4 [102]
8 1/2 [216]
Ø5 9/16 [140]
12 [306]
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
1/4 [6]
6 1/4 [160]
8 1/2 [216]

Figure C–24. 865504: Mounting dimensions – Model 5206 source housing, 500 mCi (sheet 1 of 1)

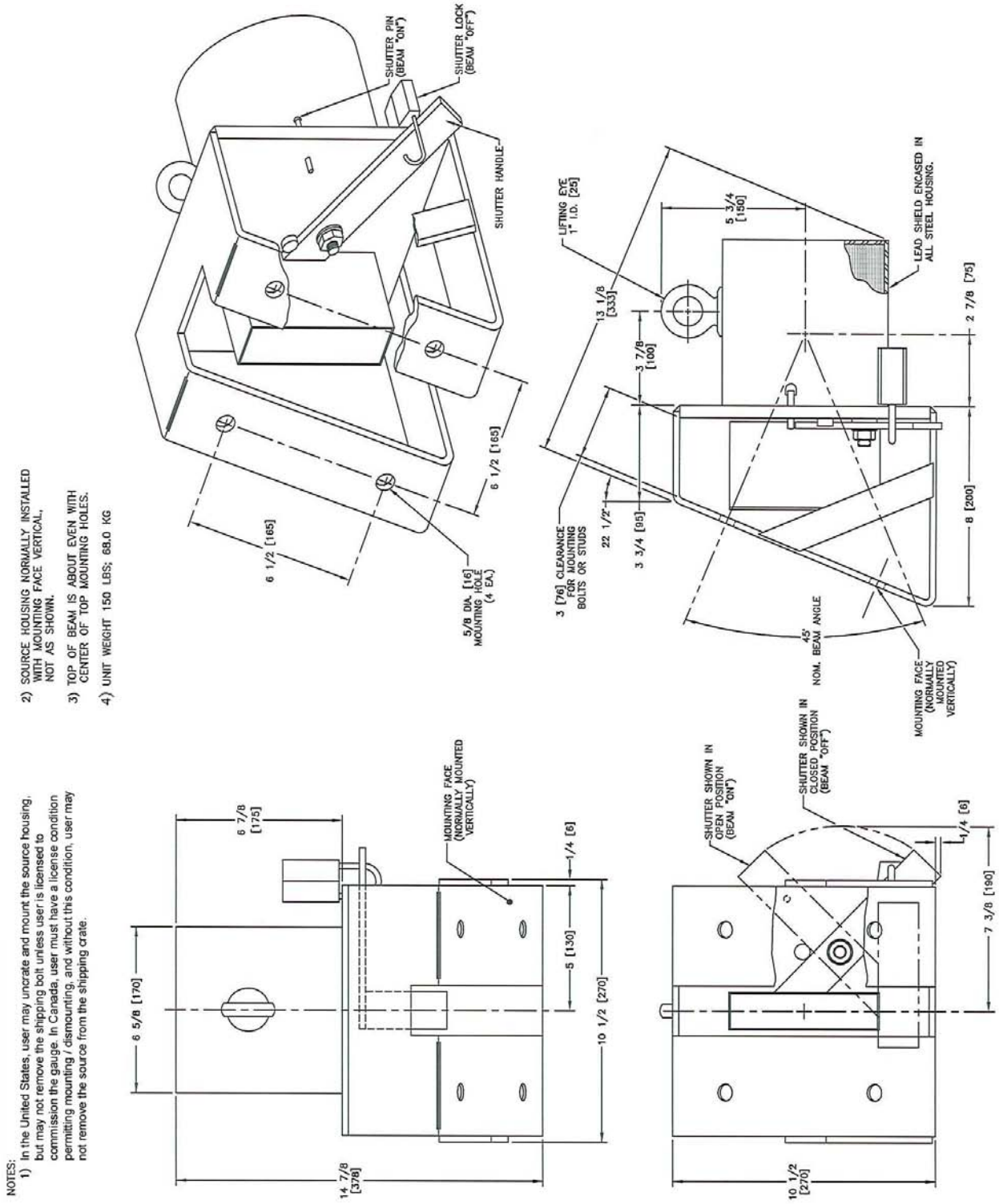

NOTES:
1) In the United States, user may uncrate and mount the source housing, but may not remove the shipping bolt unless user is licensed to commission the gauge. In Canada, user must have a license condition permitting mounting / dismounting, and without this condition, user may not remove the source from the shipping crate.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
3) TOP OF BEAM IS ABOUT EVEN WITH CENTER OF TOP MOUNTING HOLES.
4) UNIT WEIGHT 150 LBS; 68.0 KG
SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
6 1/2 [165]
6 1/2 [165]
5/8 DIA. [16] MOUNTING HOLE (4 EA.)
LIFTING EYE 1" I.D. [25]
13 1/8 [333]
5 3/4 [150]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING.
2 7/8 [75]
3 7/8 [100]
3 [76] CLEARANCE FOR MOUNTING BOLTS OR STUDS
22 1/2°
3 3/4 [95]
8 [200]
45° NOM. BEAM ANGLE
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
6 7/8 [175]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
1/4 [6]
6 5/8 [170]
5 [130]
10 1/2 [270]
14 7/8 [378]
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
1/4 [6]
7 3/8 [190]
10 1/2 [270]

Figure C–25. 865514: Mounting dimensions – Model 5207 source housing, 2000 mCi (sheet 1 of 1)

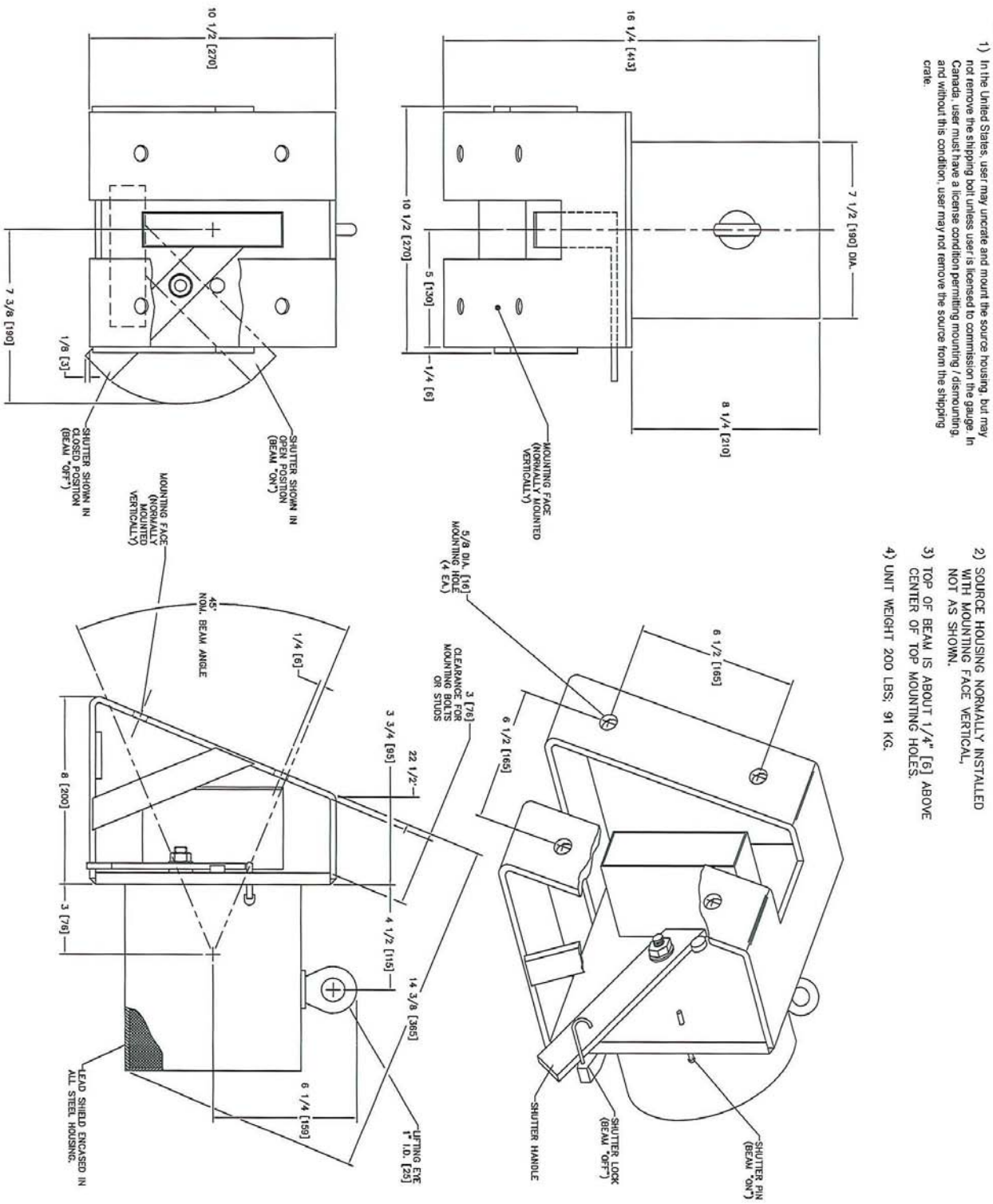

NOTES:
1) In the United States, user may uncrate and mount the source housing, but may not remove the shipping bolt unless user is licensed to commission the gauge. In Canada, user must have a license condition permitting mounting / dismounting, and without this condition, user may not remove the source from the shipping crate.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
3) TOP OF BEAM IS ABOUT 1/4" [6] ABOVE CENTER OF TOP MOUNTING HOLES.
4) UNIT WEIGHT 200 LBS; 91 KG.
10 1/2 [270]
7 3/8 [190]
1/8 [3]
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
16 1/4 [413]
10 1/2 [270]
5 [130]
1/4 [6]
7 1/2 [190] DIA.
8 1/4 [210]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
45° NOM. BEAM ANGLE
1/4 [6]
8 [200]
3 [76]
5/8 DIA [16] MOUNTING HOLE (4 EA.)
3 [76] CLEARANCE FOR MOUNTING BOLTS OR STUDS
3 3/4 [95]
22 1/2"
4 1/2 [115]
14 3/8 [365]
6 1/4 [159]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING.
LIFTING EYE 1" I.D. [25]
6 1/2 [165]
6 1/2 [165]
SHUTTER HANDLE
SHUTTER LOCK (BEAM "OFF")
SHUTTER PIN (BEAM "ON")

Figure C–26. 865524: Mounting dimensions – Model 5208 source housing, 8000 mCi (sheet 1 of 1)

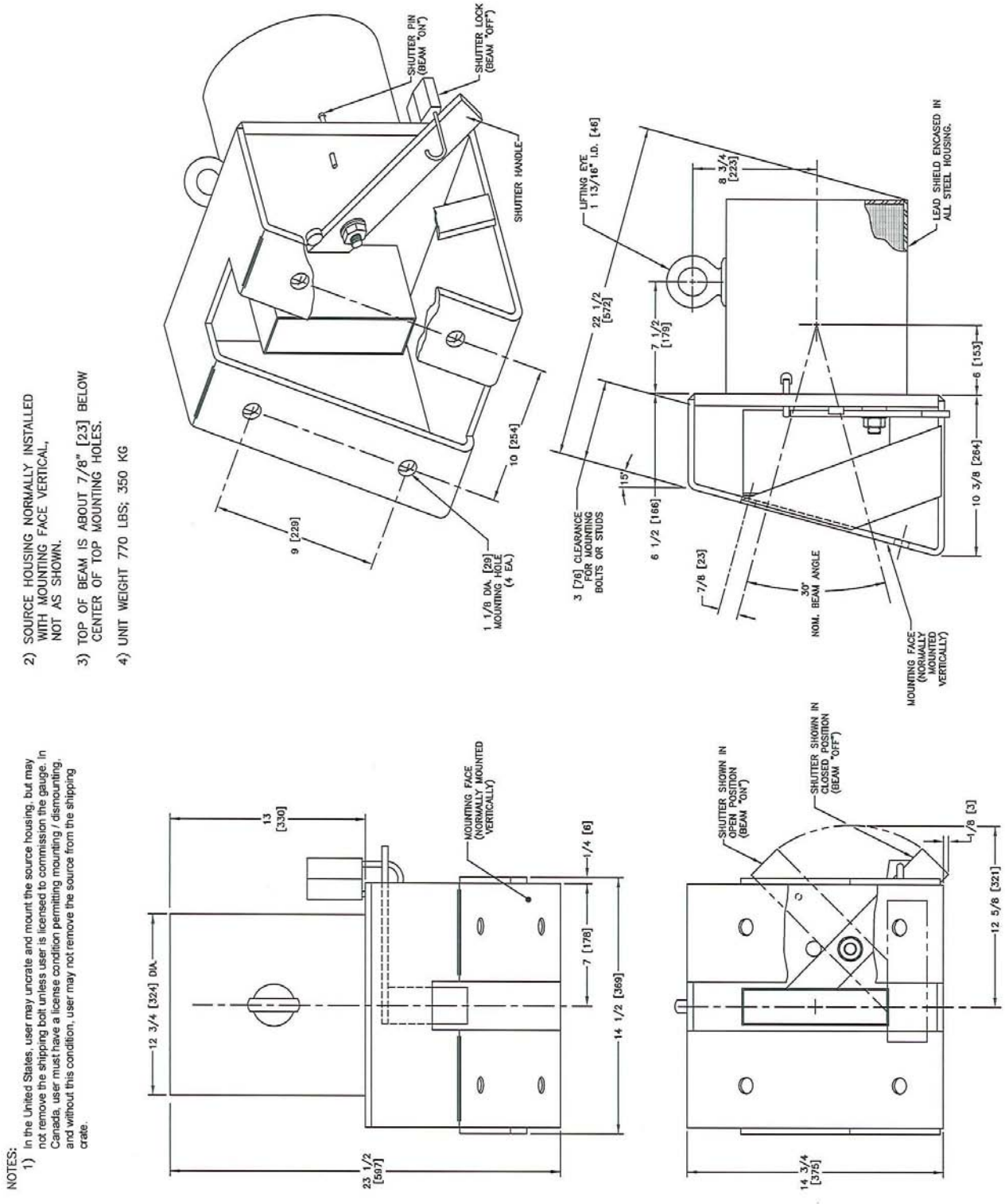

NOTES:
1) In the United States, user may uncrate and mount the source housing, but may not remove the shipping bolt unless user is licensed to commission the gauge. In Canada, user must have a license condition permitting mounting / dismounting, and without this condition, user may not remove the source from the shipping crate.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
3) TOP OF BEAM IS ABOUT 7/8" [23] BELOW CENTER OF TOP MOUNTING HOLES.
4) UNIT WEIGHT 770 LBS; 350 KG
SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
9 [229]
10 [254]
1 1/8 DIA. [29] MOUNTING HOLE (4 PL.)
LIFTING EYE 1 13/16" I.D. [46]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING.
8 3/4 [223]
22 1/2 [572]
7 1/2 [179]
6 [153]
10 3/8 [264]
3 [76] CLEARANCE FOR MOUNTING BOLTS OR STUDS
15°
6 1/2 [166]
7/8 [23]
30° NOM. BEAM ANGLE
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
13 [330]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
1/4 [6]
12 3/4 [324] DIA.
7 [178]
14 1/2 [369]
23 1/2 [597]
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
1/8 [3]
12 5/8 [321]
14 3/4 [375]

Figure C–27. 866891: Mounting dimensions – Model 5210 source housing, 10 Ci Cs-137, 3 Ci Co-60 (sheet 1 of 1)

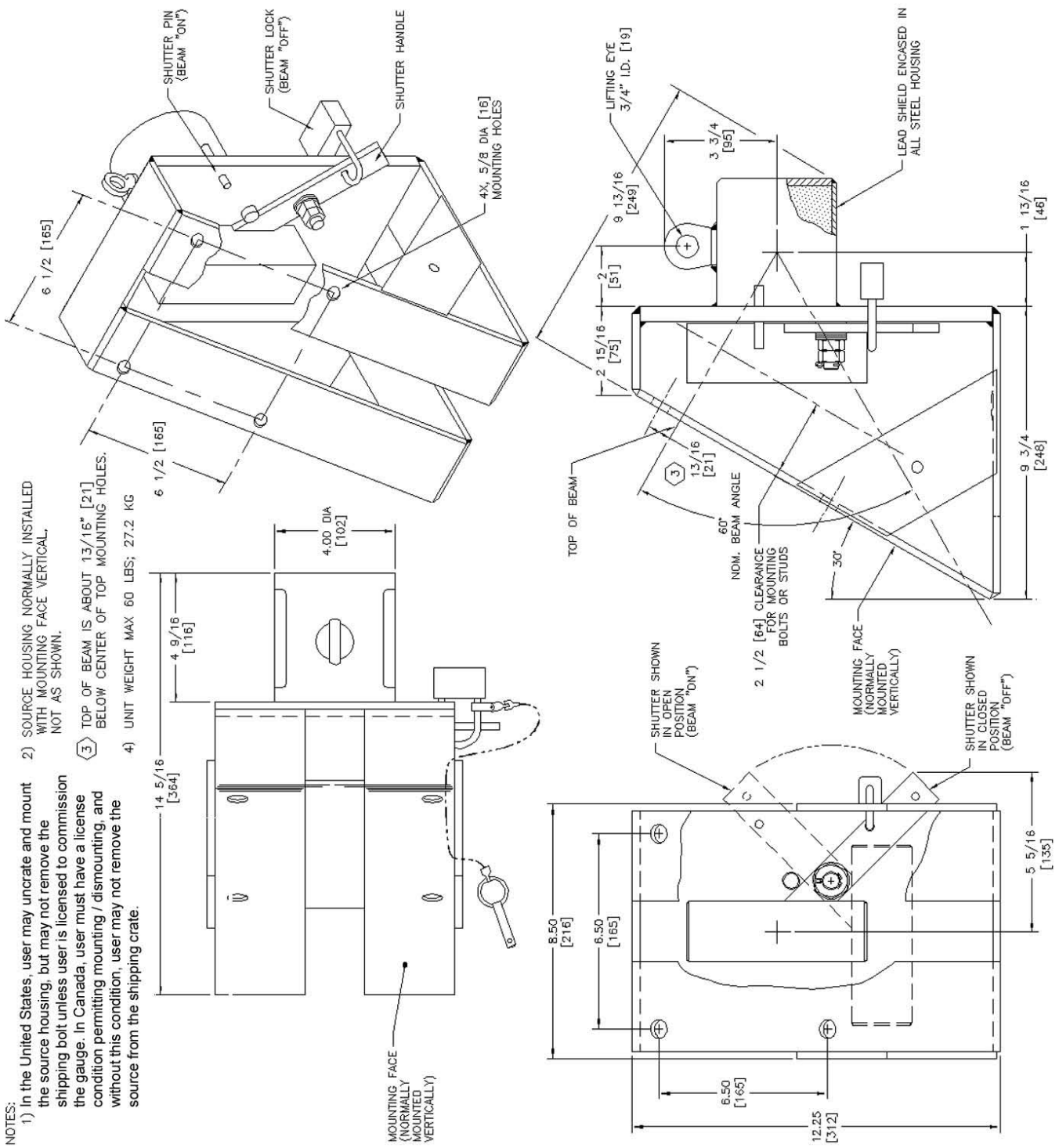

NOTES:
1) In the United States, user may uncrate and mount the source housing, but may not remove the shipping bolt unless user is licensed to commission the gauge. In Canada, user must have a license condition permitting mounting / dismounting, and without this condition, user may not remove the source from the shipping crate.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
3 TOP OF BEAM IS ABOUT 13/16" [21] BELOW CENTER OF TOP MOUNTING HOLES.
4) UNIT WEIGHT MAX 60 LBS; 27.2 KG
SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
4X, 5/8 DIA [16] MOUNTING HOLES
6 1/2 [165]
6 1/2 [165]
4.00 DIA [102]
4 9/16 [116]
14 5/16 [364]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
LIFTING EYE 3/4" I.D. [19]
9 13/16 [249]
3 3/4 [95]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING
1 13/16 [46]
2 [51]
2 15/16 [75]
9 3/4 [248]
TOP OF BEAM
3 13/16 [21]
60° NOM. BEAM ANGLE
2 1/2 [64] CLEARANCE FOR MOUNTING BOLTS OR STUDS
30°
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
8.50 [216]
6.50 [165]
5 5/16 [135]
6.50 [165]
12.25 [312]

Figure C–28. 868628: Mounting dimensions – Model 5205B source housing (sheet 1 of 1)

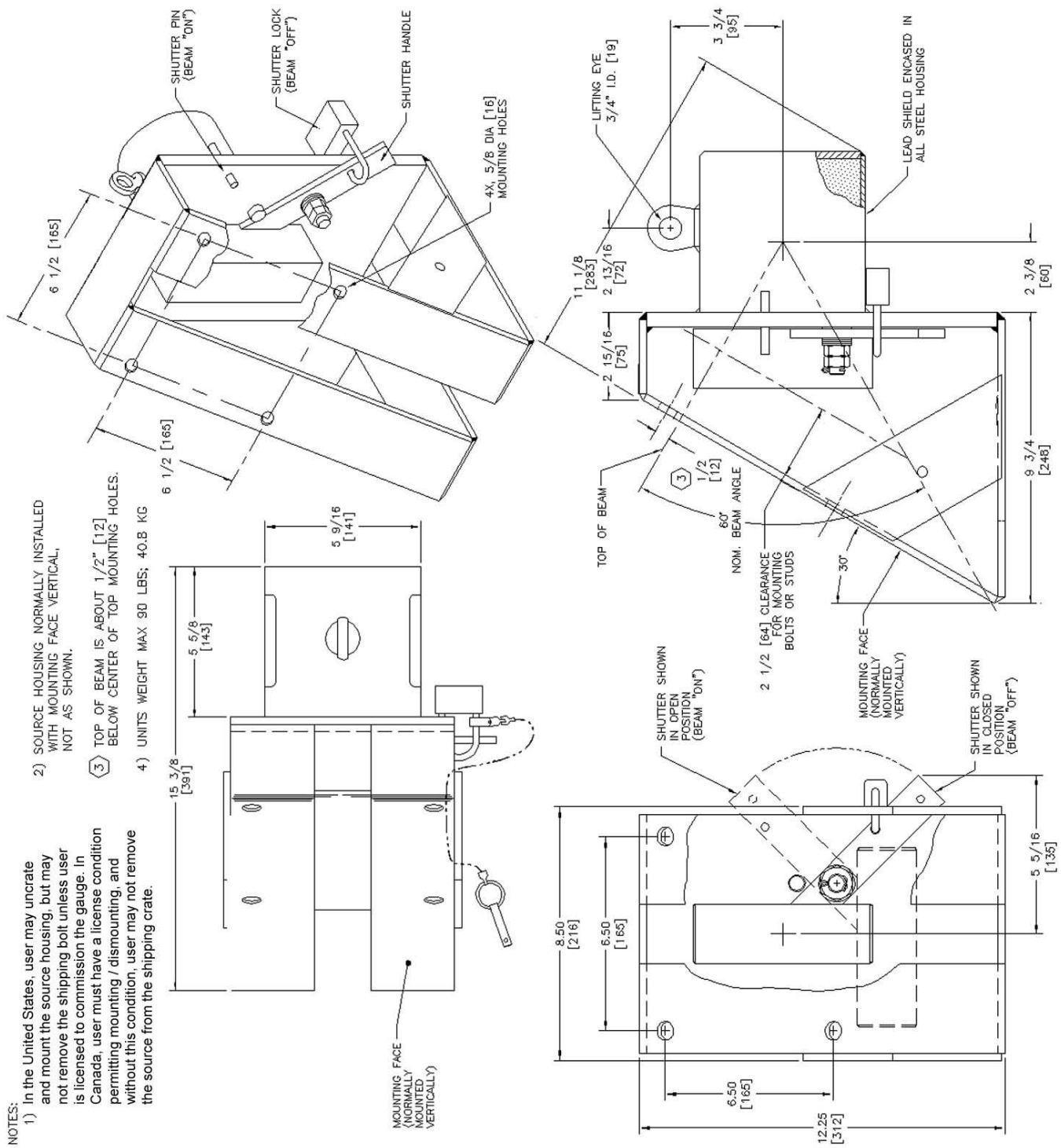

SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
4X, 5/8 DIA [16] MOUNTING HOLES
6 1/2 [165]
6 1/2 [165]
LIFTING EYE 3/4" I.D. [19]
3 3/4 [95]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING
11 1/8 [283]
2 13/16 [72]
2 15/16 [75]
2 3/8 [60]
9 3/4 [248]
3 1/2 [12]
60° BEAM ANGLE
30°
TOP OF BEAM
2 1/2 [64] CLEARANCE FOR MOUNTING BOLTS OR STUDS
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
5 9/16 [141]
5 5/8 [143]
15 3/8 [391]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
8.50 [216]
6.50 [165]
5 5/16 [135]
6.50 [165]
12.25 [312]
NOTES:
1) In the United States, user may uncrate and mount the source housing, but may not remove the shipping bolt unless user is licensed to commission the gauge. In Canada, user must have a license condition permitting mounting / dismounting, and without this condition, user may not remove the source from the shipping crate.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
3 TOP OF BEAM IS ABOUT 1/2" [12] BELOW CENTER OF TOP MOUNTING HOLES.
4) UNITS WEIGHT MAX 90 LBS; 40.8 KG

Figure C–29. 868629: Mounting dimensions – Model 5206B source housing (sheet 1 of 1)

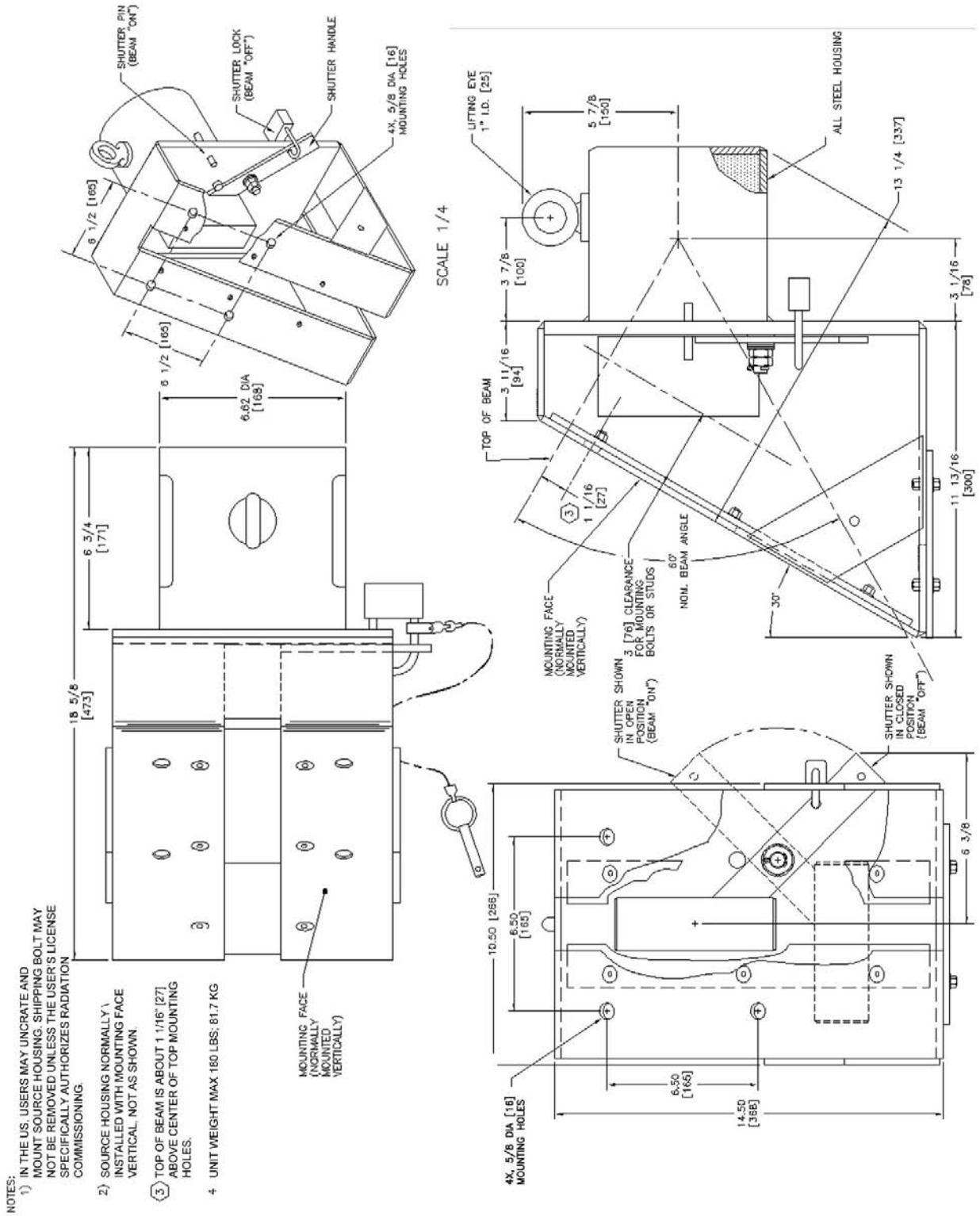

SCALE 1/4
SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
4X, 5/8 DIA [16] MOUNTING HOLES
LIFTING EYE 1" I.D. [25]
ALL STEEL HOUSING
TOP OF BEAM
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
3 [76] CLEARANCE FOR MOUNTING BOLTS OR STUDS
60° NOM. BEAM ANGLE
30°
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
NOTES:
1) IN THE US, USERS MAY UNCRATE AND MOUNT SOURCE HOUSING. SHIPPING BOLT MAY NOT BE REMOVED UNLESS THE USER'S LICENSE SPECIFICALLY AUTHORIZES RADIATION COMMISSIONING.
2) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN
3 TOP OF BEAM IS ABOUT 1 1/16" [27] ABOVE CENTER OF TOP MOUNTING HOLES.
4 UNIT WEIGHT MAX 160 LBS; 81.7 KG

Figure C–30. 868630: Mounting dimensions – Model 5207B source housing (sheet 1 of 1)

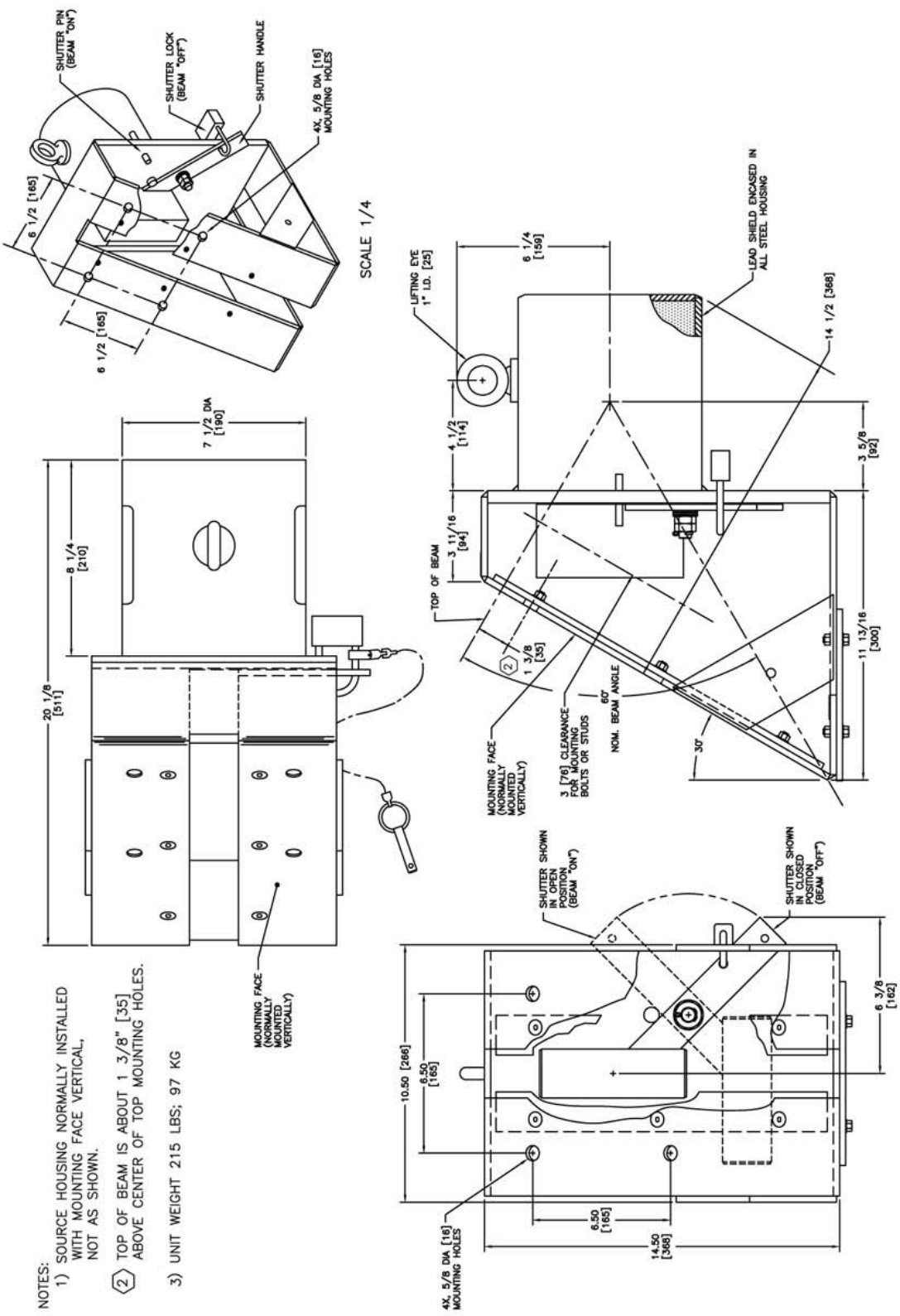

SHUTTER PIN (BEAM "ON")
SHUTTER LOCK (BEAM "OFF")
SHUTTER HANDLE
4X, 5/8 DIA [16] MOUNTING HOLES
6 1/2 [165]
6 1/2 [165]
SCALE 1/4
7 1/2 DIA [190]
8 1/4 [210]
20 1/8 [511]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
LIFTING EYE 1" I.D. [25]
6 1/4 [159]
LEAD SHIELD ENCASED IN ALL STEEL HOUSING
14 1/2 [368]
4 1/2 [114]
3 5/8 [92]
3 11/16 [94]
TOP OF BEAM
2
1 3/8 [35]
11 13/16 [300]
MOUNTING FACE (NORMALLY MOUNTED VERTICALLY)
3 [76] CLEARANCE FOR MOUNTING BOLTS OR STUDS
NOM. BEAM ANGLE
60°
30°
SHUTTER SHOWN IN OPEN POSITION (BEAM "ON")
SHUTTER SHOWN IN CLOSED POSITION (BEAM "OFF")
6 3/8 [162]
10.50 [266]
6.50 [165]
6.50 [165]
14.50 [368]
4X, 5/8 DIA [16] MOUNTING HOLES
NOTES:
1) SOURCE HOUSING NORMALLY INSTALLED WITH MOUNTING FACE VERTICAL, NOT AS SHOWN.
2 TOP OF BEAM IS ABOUT 1 3/8" [35] ABOVE CENTER OF TOP MOUNTING HOLES.
3) UNIT WEIGHT 215 LBS; 97 KG

Figure C–31. 868631: Mounting dimensions – Model 5208B source housing (sheet 1 of 1)

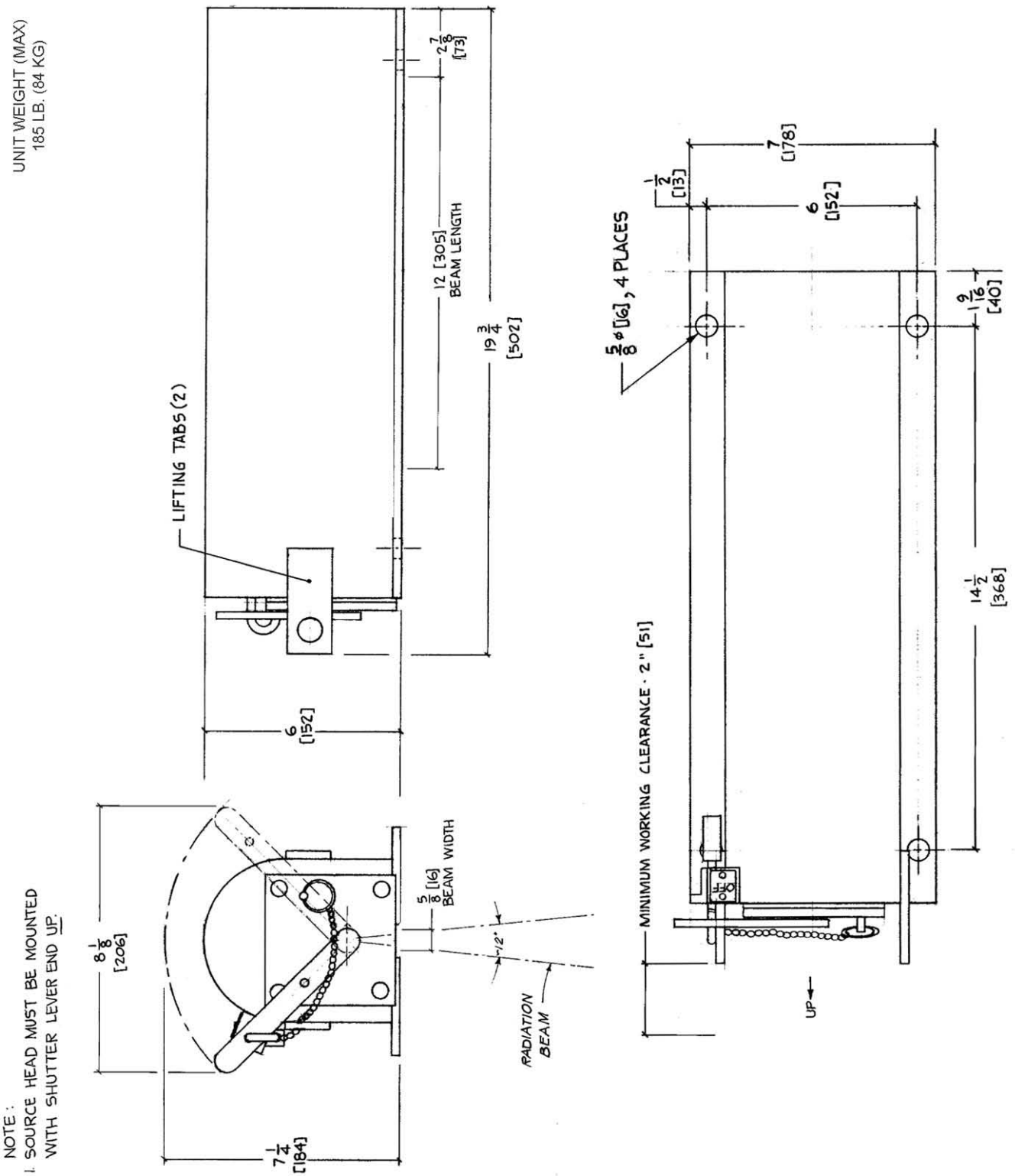


Figure C–32. 860463: Mounting dimensions – Model 5194 strip source, 1 ft, 500 mCi (sheet 1 of 1)

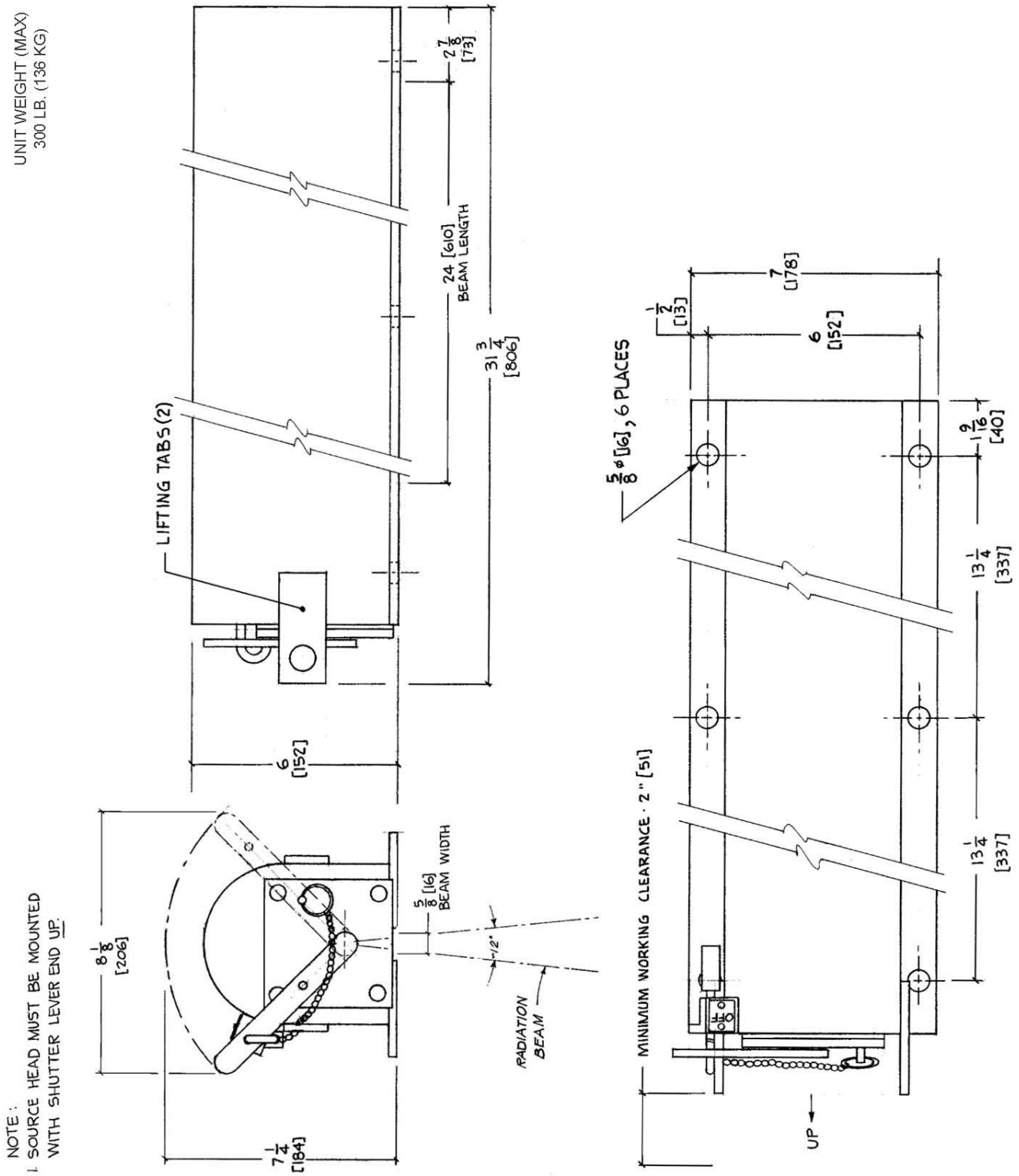


Figure C–33. 860473: Mounting dimensions – Model 5195 strip source, 2 ft, 1000 mCi (sheet 1 of 1)

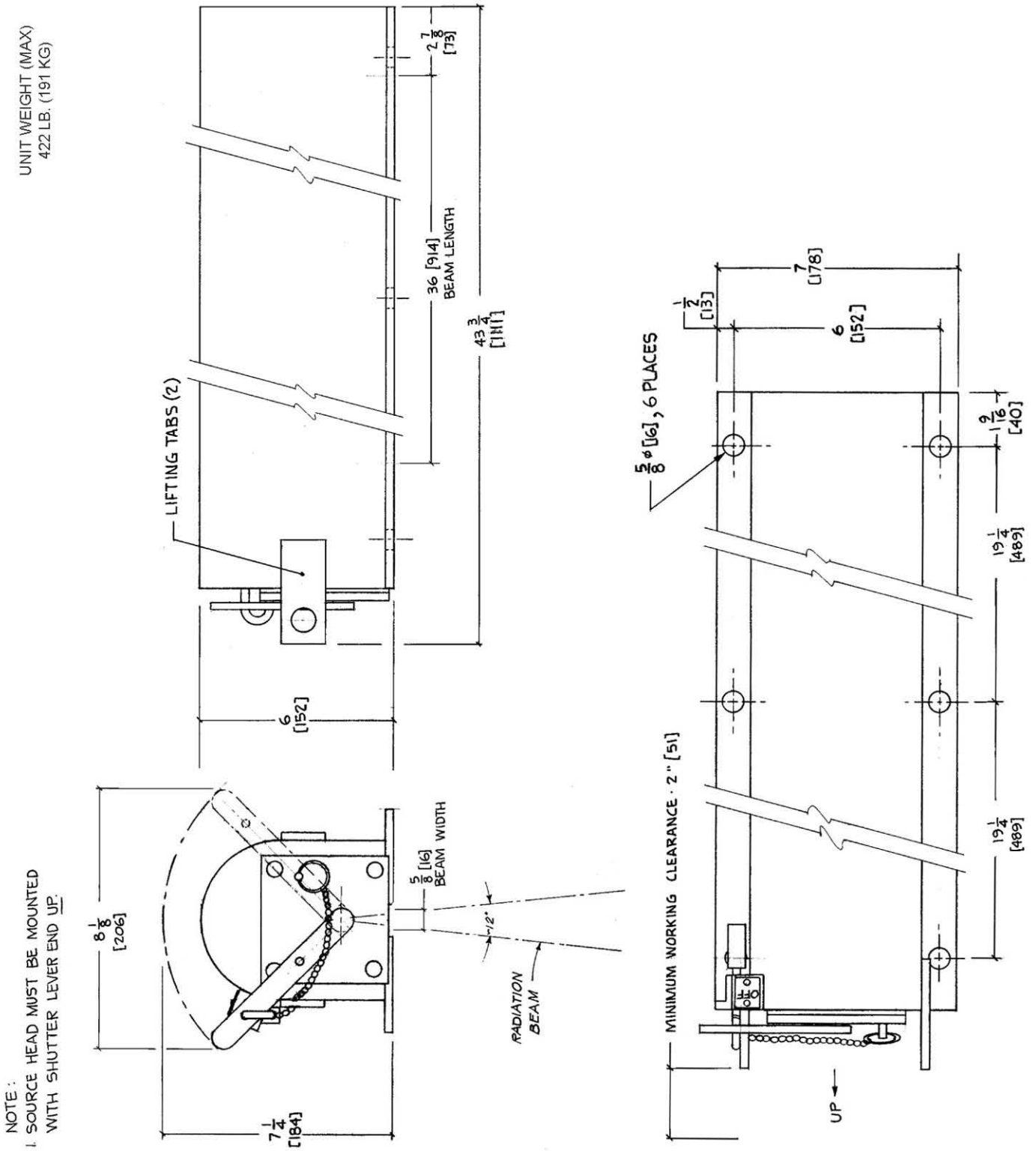


Figure C–34. 860483: Mounting dimensions – Model 5196 strip source, 3 ft, 1000 mCi (sheet 1 of 1)

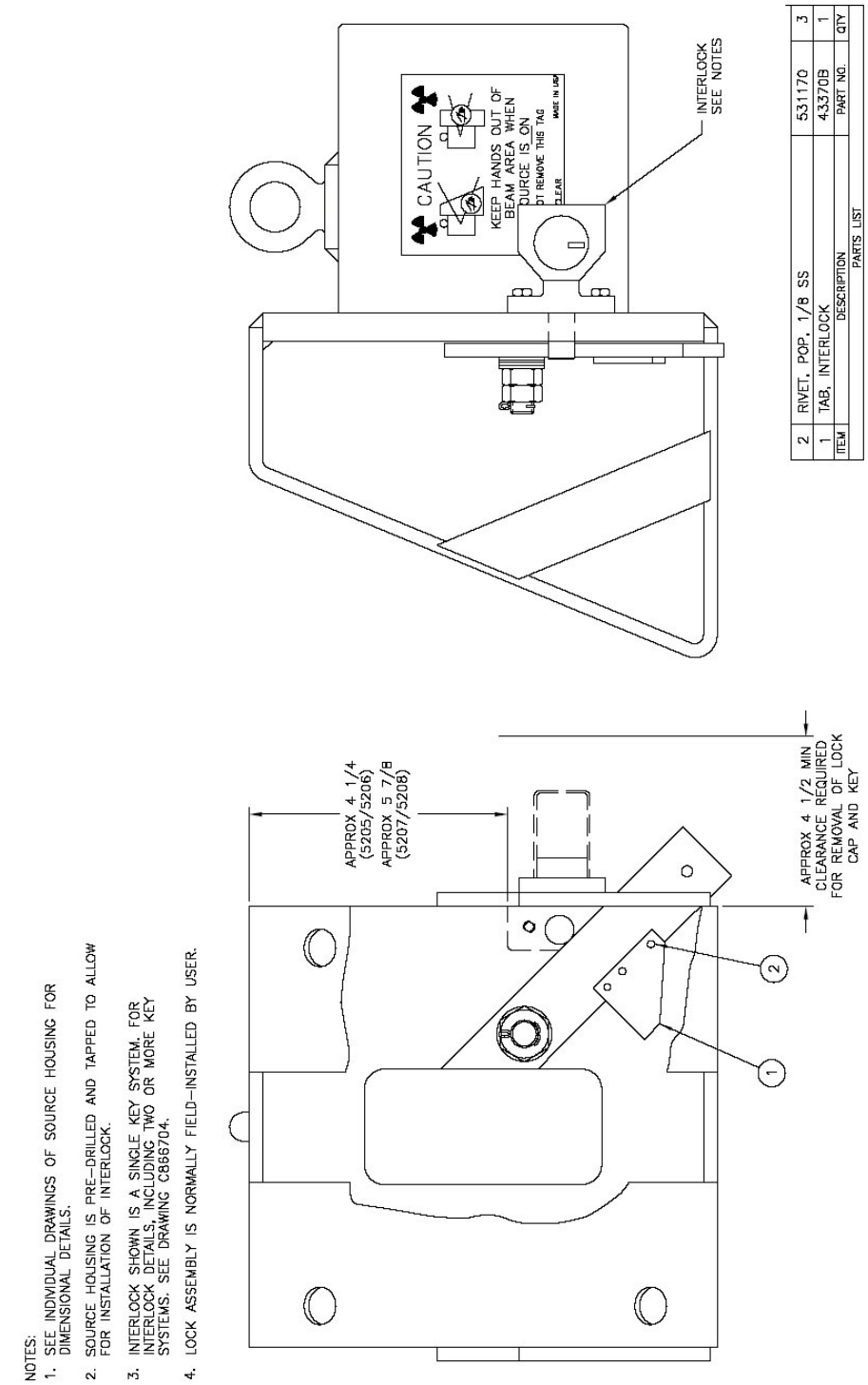

NOTES:
1. SEE INDIVIDUAL DRAWINGS OF SOURCE HOUSING FOR DIMENSIONAL DETAILS.
2. SOURCE HOUSING IS PRE-DRILLED AND TAPPED TO ALLOW FOR INSTALLATION OF INTERLOCK.
3. INTERLOCK SHOWN IS A SINGLE KEY SYSTEM. FOR INTERLOCK DETAILS, INCLUDING TWO OR MORE KEY SYSTEMS, SEE DRAWING C866704.
4. LOCK ASSEMBLY IS NORMALLY FIELD-INSTALLED BY USER.
APPROX 4 1/4 (5205/5206)
APPROX 5 7/8 (5207/5208)
APPROX 4 1/2 MIN CLEARANCE REQUIRED FOR REMOVAL OF LOCK CAP AND KEY
CAUTION
KEEP HANDS OUT OF BEAM AREA WHEN SOURCE IS ON
DO NOT REMOVE THIS TAG
INTERLOCK SEE NOTES
2 RIVET, POP, 1/8 SS 531170 3
1 TAB, INTERLOCK 433708 1
ITEM DESCRIPTION PART NO. QTY
PARTS LIST

Figure C–35. 866764: Interlock option for Models 5205–5208 source housings (sheet 1 of 1)

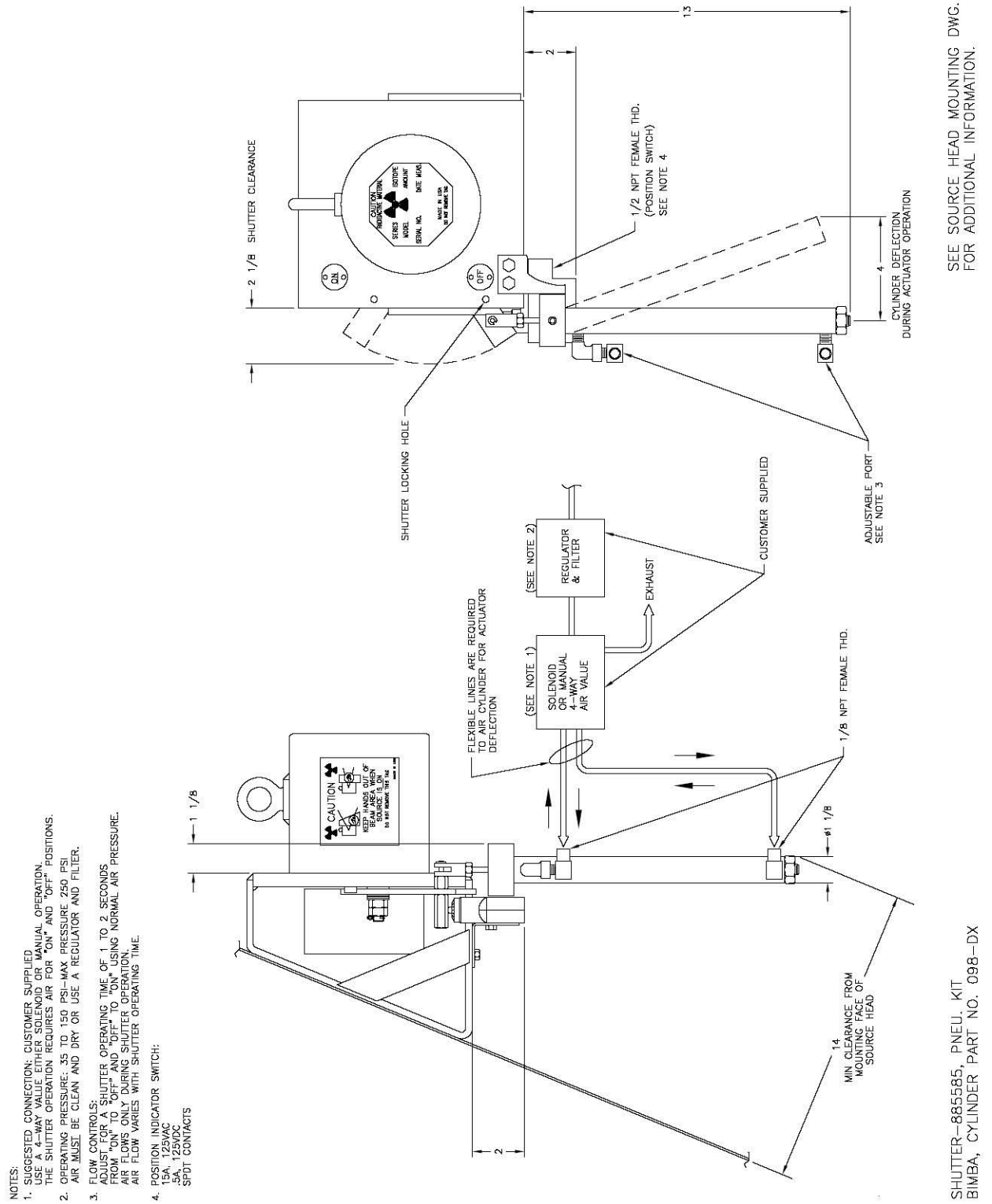
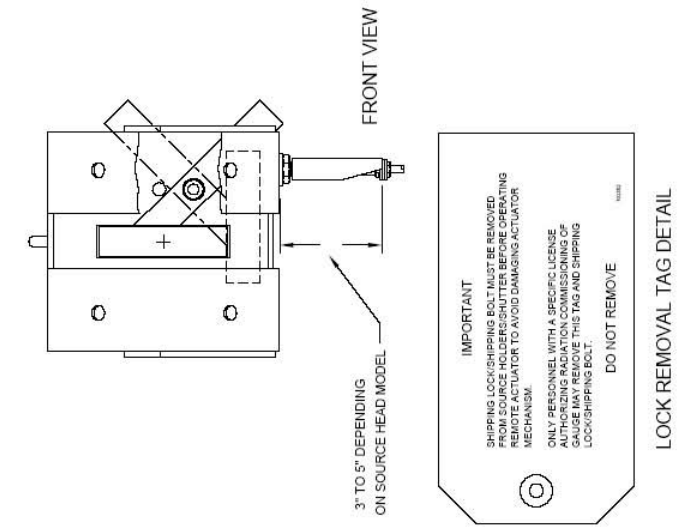


Figure C–36. 866664: Models 5205–5208 pneumatic actuator and position switch (sheet 1 of 1)


FRONT VIEW
3" TO 5" DEPENDING
ON SOURCE HEAD MODEL
IMPORTANT
SHIPPING LOCK/SHIPPING BOLT MUST BE REMOVED FROM SOURCE HOLDER/SHUTTER BEFORE OPERATING REMOTE ACTUATOR TO AVOID DAMAGING ACTUATOR MECHANISM.
ONLY PERSONNEL WITH A SPECIFIC LICENSE AUTHORIZING RADIATION COMMISSIONING OF GAUGE MAY REMOVE THIS TAG AND SHIPPING LOCK/SHIPPING BOLT.
DO NOT REMOVE
LOCK REMOVAL TAG DETAIL

NOTES:

1. ACTUATOR MOUNTING:
   a. ATTACH ACTUATOR TO MOUNTING PLATE USING FOUR DRILLED HOLES AND HARDWARE (SUPPLIED BY CUSTOMER).
   b. ATTACH CABLE W/2 OR 3 CLIPS AND #10 SHEET METAL SCREWS. CAUTION: MINIMUM BEND RADIUS OF CABLE IS 12 INCHES.
   c. INSERT END OF CABLE THRU CABLE CONNECTOR HOUSING AND PLACE CONNECTOR ON INTERLOCK ROD. ATTACH THREADED MOUNTING BUSHING TO C WASHER WITH BOTH WASHERS ON THE OUTSIDE. WITH BOTH THE SOURCE SHUTTER HANDLE AND REMOTE ACTUATOR HANDLE IN THE "OFF" POSITION, ADJUST POSITION OF NUTS TO APPLY A SLIGHT PRESSURE ON THE SOURCE HANDLE IN THE "OFF" DIRECTION. TIGHTEN OUTER NUT. INSTALL HAIR PIN CLIP ON END OF INTERLOCK ROD TO SECURE CONNECTOR. CHECK OPERATION OF ACTUATOR. SHUTTER SHOULD BE HELD FIRMLY IN THE "ON" AND "OFF" POSITIONS AND DETENT SHOULD PROPERLY ENGAGE. BE SURE TO PULL DETENT KNOB BEFORE MOVING ACTUATOR HANDLE.
   d. WILL ACCEPT THE FOLLOWING INTERLOCKS:
      1. SUPERIOR B-8003
         SUPERIOR B-3003
         SUPERIOR INTERLOCK CORP.
         73-39 CENTRAL AVENUE
         GLENDALE L.I. N.Y. 11227
      2. I-T-E KIRK TYPE B
         GOULD-BROWN BOVERI
         POWER SYSTEMS DIVISION
         (OR LOCAL SALES OFFICE)
         GREENSBURG, PA. 15601
      3. CASTELL SAFETY LOCK
         TYPE K/F (FLANGED) LOCK
         P.O. BOX 18181
         ERLANGER, KENTUCKY 41018

      THESE INTERLOCKS SHOULD HAVE "0" BOLT PROJECTION 5/8 DIA. BOLT, 3/4" TRAVEL, 3/8-16 x 3/4 HEX HEAD MOUNTING BOLTS AND DUST COVERS.
2. SOURCE HEAD MOUNTING:

   FOR SOURCE HEAD MOUNTING SEE ONE OF THE FOLLOWING DRAWINGS:

MODEL NUMBER	DRAWING NUMBER
5205	D865494
5206	D865504
5207	D865514
5208	D865524

3. PARTS LIST:

ITEM	DESCRIPTION (MFG'S P/N)		QTY
1	ASSY., REM ACT BASE, 5205-08	885887	1
2	VINYL-COATED CLIP (KICKHAEFER CWV-0707)	613210	3
3	SHEET METAL SCREW, #10 x 1/2", TYPE A	911182	3
4	CLIP, HAIR PIN (1 EXTRA)	535150	2
5	LOCK REMOVAL TAG	702352	1
6	CABLE CONNECTOR HOUSING	499763	1
7	1" PIPE NUTS	912129	2
8	NUT, HEX 3/8-16, 9/16"	912132	2

   SEE INSTRUCTION MANUAL FOR ADDITIONAL EXPLANATION.

   ACTUATOR IS SHOWN AS MOUNTED BELOW THE SOURCE HEAD.
   WHEN MOUNTING ABOVE THE SOURCE HEAD TURN THE ACTUATOR UPSIDE DOWN TO PREVENT ADDED CABLE BEND. MINIMUM BEND RADIUS IS 12 INCHES.

Figure C–37. 867269: Mounting instructions, remote manual actuator, Models 5205–5208 (sheet 1 of 2)

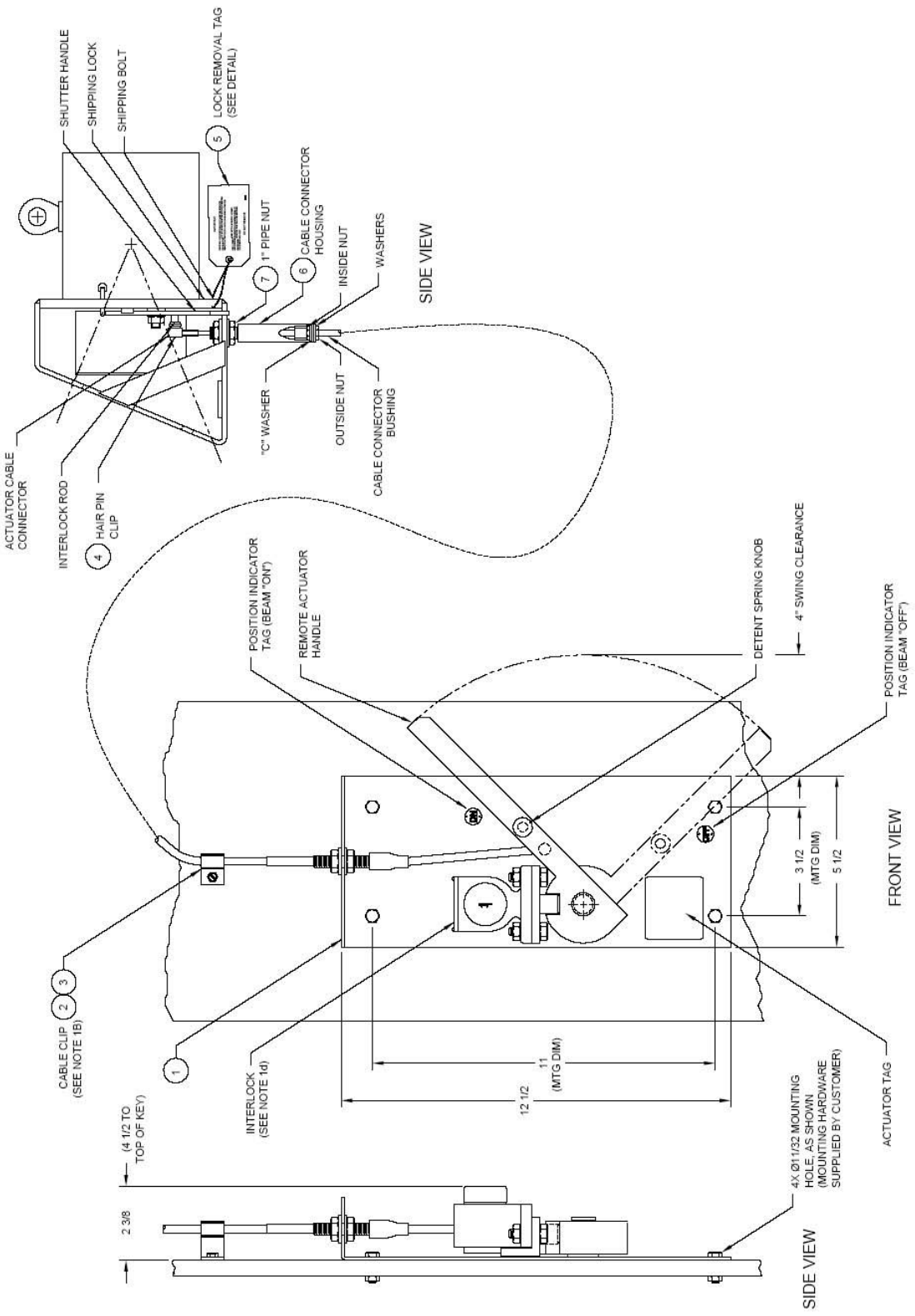


Figure C–38. 867269: Mounting instructions, remote manual actuator, Models 5205–5208 (sheet 2 of 2)

REF: KIT 886714-1	
PARTS LIST	
1	886671-1 HART PWA
2	810152 CABLE ASSY
3	911551 4-40 SCREWS (3 EA.)
4	470011 HART RETROFIT BRACKET
5	913304 WASHER FIBER (3 EA.)
6	868709 INSTRUCTIONS
7	595026 PROGRAMMED EPROM

INSTRUCTIONS:

1. AFTER EXPOSING ELECTRONIC MODULE AND SECURING:
   A) REMOVE FOUR (4) SCREWS HOLDING END PLATE/HANDLE TO CHASSIS (SAVE HARDWARE FOR REUSE).
   B) REMOVE HANDLE FROM END PLATE (SAVE HARDWARE FOR REUSE).
2. REASSEMBLE:
   A) REATTACH HANDLE TO END PLATE WITH HART RETROFIT BRACKET ON OPPOSITE SIDE. (NOTE: 3 PWA STANDOFFS TOWARD CPU SIDE OF CHASSIS.)
   B) MOUNT HART PWA TO RETROFIT BRACKET USING THREE (3) SCREWS IN KIT. WASHERS ARE TO BE BETWEEN STANDOFF AND PCB.
   C) REMOUNT END PLATE/BRACKET/HANDLE ASSEMBLY TO CHASSIS.
3. CONNECT CABLE HARNESS; BETWEEN HART PWA AND SERIAL CONNECTION ON CPU.
4. USING PROPER TOOL TO REPLACE EPROM AT U6 ON CPU PCB WITH NEW EPROM (ITEM 7).

Figure C–39. 868709: HART retrofit, LevelPRO

Appendix D
Replacing the CPU PROM & HART PROM

Note This appendix applies only to gauges that have the HART communication option installed and have CPU software prior to version 5.15 or HART board software prior to 1.17. ▲

Purpose

Software has been released for LevelPRO detectors that have the HART communication option installed. This software makes the HART communication and the Thermo Scientific 9734 handheld terminal (HHT) communication more reliable. This software upgrade requires that both the LevelPRO CPU PROM and the HART board PROM be replaced. This appendix provides the instructions for doing so.

Procedure

Due to the difficulty in reaching the HART board, it is recommended that the detector be removed from the housing and taken to a clean, dry area to perform this procedure.

Caution If performed in place, care needs to be taken to not drop the PROMs or the LevelPRO. ▲

Once the detector is out of the housing, you will see that the CPU board is readily accessible; however, the HART board is mounted between the chassis plates and is difficult to access.

Figure D–1. Location of CPU PROM

Caution It is strongly recommended that you use a PROM extraction tool to remove the PROM from its socket. These can usually be purchased from the local electronics supply store. Failure to use the proper tool can result in damage to the PROM socket, necessitating replacement of the board. ▲

Figure D–2. Prom extraction tool

If you do not have an extraction tool, a small bladed screwdriver or curved tip tweezers can be used in critical situations. As seen in Figure D–3, two corners of the PROM socket have slots for the extraction tool. These slots can be used to extract the PROM using a small bladed screwdriver or curved tip tweezers (reference Figures D–4 and D–5). Pry up on each of the two extraction corners a little at a time, going back and forth to extract the PROM evenly out of the socket.

Caution Be very careful not to crack or otherwise damage the socket! ▲

Figure D–3.

Figure D–4.

Figure D–5.

Once the old PROM is extracted, align the new PROM on the socket so that the beveled corner of the PROM (shown in Figure D–3) matches the beveled corner of the socket. Push gently down on the PROM until it snaps into place in the socket. **If becomes misaligned or is hard to push, stop and start over.** Once it snaps into the socket, it is installed.

Note The 595026 PROM goes on the CPU board and the 595021 PROM goes on the HART board. While no damage will occur if the PROMs are accidently switched, the gauge will not work. ▲

As can be seen in Figure D–6, the HART board is located in the middle of the LevelPRO chassis. It is held in place with three plastic screws. At this point, you have two options. For the first option, you can remove the three screws using a small 90° screwdriver and remove the board from the middle of the chassis to change the PROM. For the second option, you can use a tool, such as the curved tip tweezers, to remove the PROM from the board while the board is still mounted.

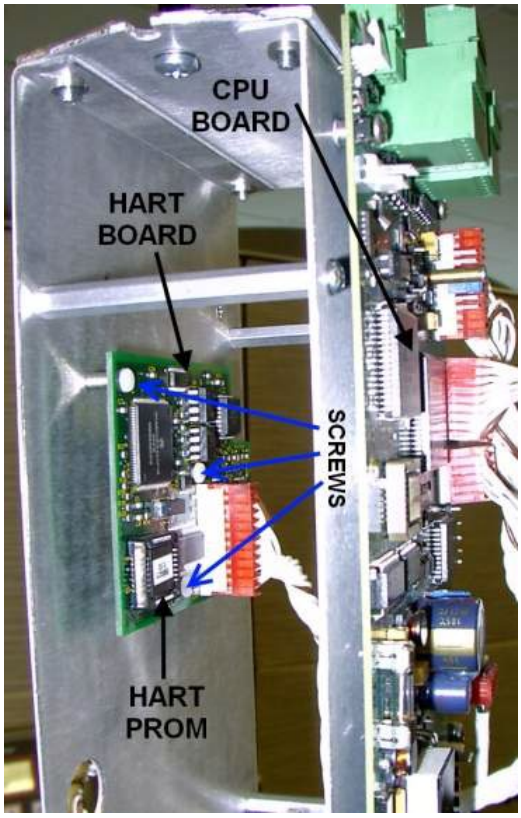


Figure D–6.

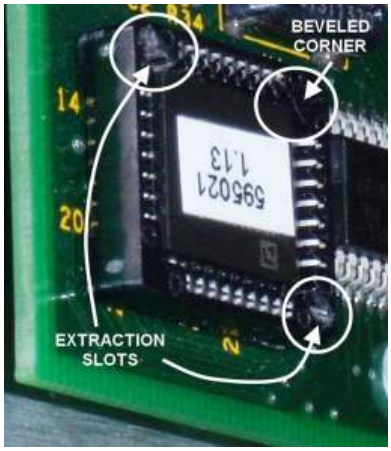


Figure D–7.

Once the old PROM is removed, align the new one on the socket so that the beveled corner of the PROM (shown in Figure D–7) matches the beveled corner of the socket. Push gently down on the PROM until it snaps into place in the socket. **If becomes misaligned or is hard to push, stop and start over.** Once it snaps into the socket, it is installed.

After installing the detector, you will need to erase memory, configure the gauge, and calibrate as described in the main body of this manual.

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Appendix E
CE-EMC Protection Installation Procedure

Purpose

To eliminate the possibility of unwanted electromagnetic signals either going from Thermo Scientific equipment into the customer's equipment or from the customer's equipment into the Thermo Scientific equipment and for protection from high voltage spikes caused by lightning, an EMC protection system has been developed for the Thermo Scientific LevelPRO gauges. This procedure provides the necessary information and instruction to perform installation of the EMC protection system properly.

Procedure

The EMC protection kit comes in four configurations:

- DC power without FOUNDATION fieldbus, p/n 886792
- DC power with FOUNDATION fieldbus, p/n 886793 (see note at end of procedure)
- AC power without FOUNDATION fieldbus, p/n 886794
- AC power with FOUNDATION fieldbus, p/n 886795 (see note at end of procedure)

The installation is the same for all four kits, except for the addition of the new AC power supply board.

As shown in Figure E–1 and Figure E–2 below, the DC kit comes with the following:

- An explosion proof housing for the EMC protection board
- The EMC protection board installed in explosion proof housing
- The EMC protection board to detector wires, terminated at the EMC protection board
- A bracket assembly to attach the EMC board housing assembly to the detector housing

The EMC protection board wires are run through the connection fittings at the factory so that the cable gland between the EMC board housing and the detector housing could be factory sealed. There are 14 wires in total: two for DC power and 12 for input/output or communication wiring.

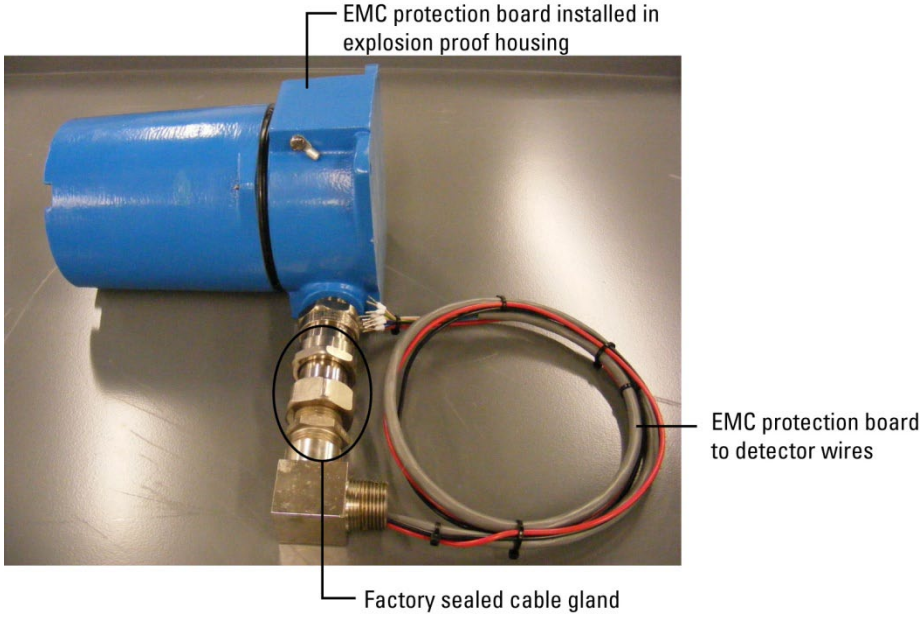
EMC protection board installed in explosion proof housing
EMC protection board to detector wires
Factory sealed cable gland

Figure E–1. EMC protection board assembly

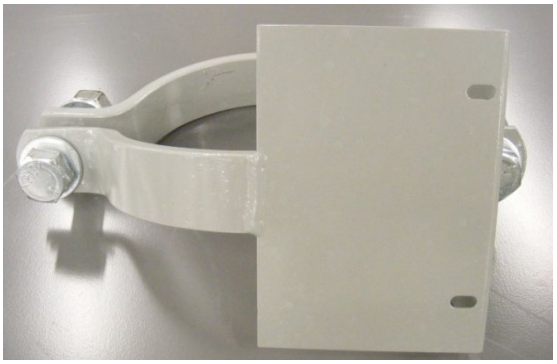

Figure E–2. Bracket assembly

Installation

Reference Figure E–3 for the steps that follow.

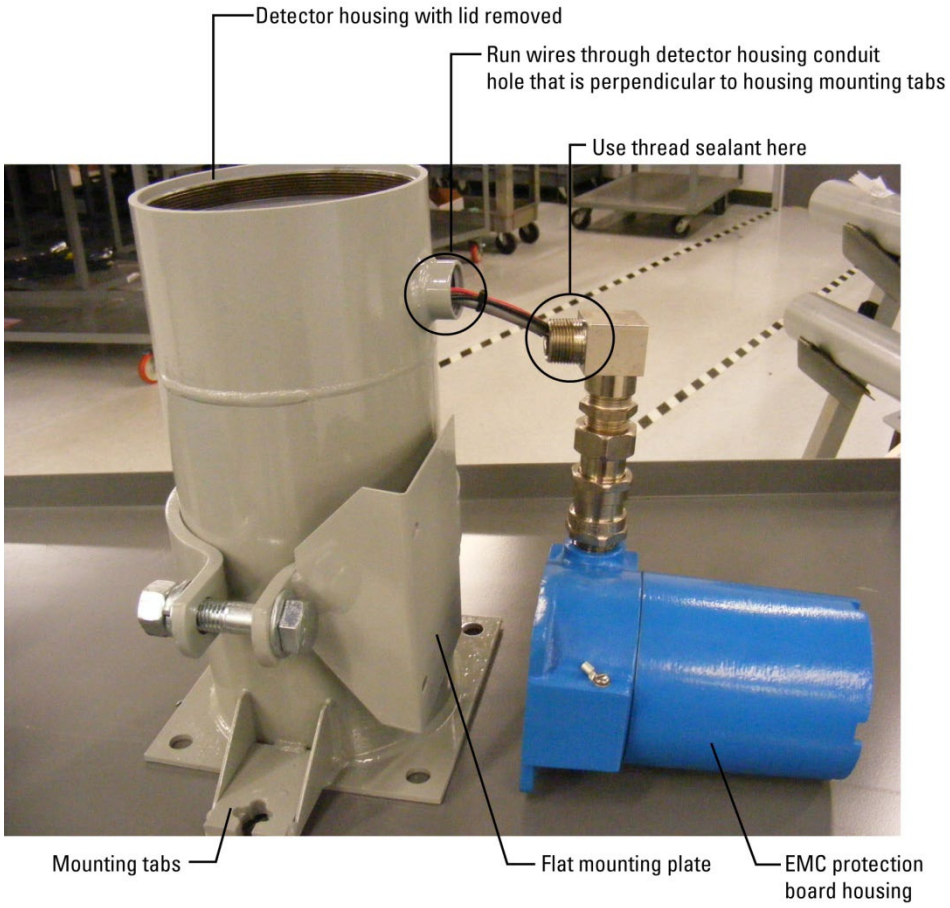
Detector housing with lid removed
Run wires through detector housing conduit hole that is perpendicular to housing mounting tabs
Use thread sealant here
Mounting tabs
Flat mounting plate
EMC protection board housing

Figure E–3. Mounting bracket installed and wiring run through proper conduit in detector housing

1. Mount the bracket assembly to the detector housing. Make sure the flat mounting plate for the EMC board housing is on the same side of the detector housing that has the conduit fitting that is perpendicular to the mounting tabs of the detector housing.
2. Remove the lid of the detector housing and run the EMC protection board wires through the conduit fitting on the housing.
3. Apply the thread sealant supplied with the kit to the fitting threads of the EMC assembly.

Caution The thread sealant used must be the same as what is supplied with the kit. ▲

4. Using the appropriate tool, screw the EMC assembly onto the detector housing approximately six to seven rotations (see note) until the connection is tight and the mounting holes of the EMC board housing align with the holes in the mounting plate of the bracket assembly. Be sure to rotate the wires that are inserted into the detector housing as the EMC assembly is rotated to keep from damaging the wires.

   Note In order to maintain area protection, a minimum engagement of five threads is required. ▲

5. Due to variances in components, extra nuts and washers have been included in the kit to use as spacers between the EMC board enclosure and the mounting plate. When the EMC assembly conduit fitting is threaded into the detector housing so that the connection is secure, use the extra nuts and washers to fill in any gap that may still exist and tighten the mounting bolts.

A completed installation on the LevelPRO housing is shown below.

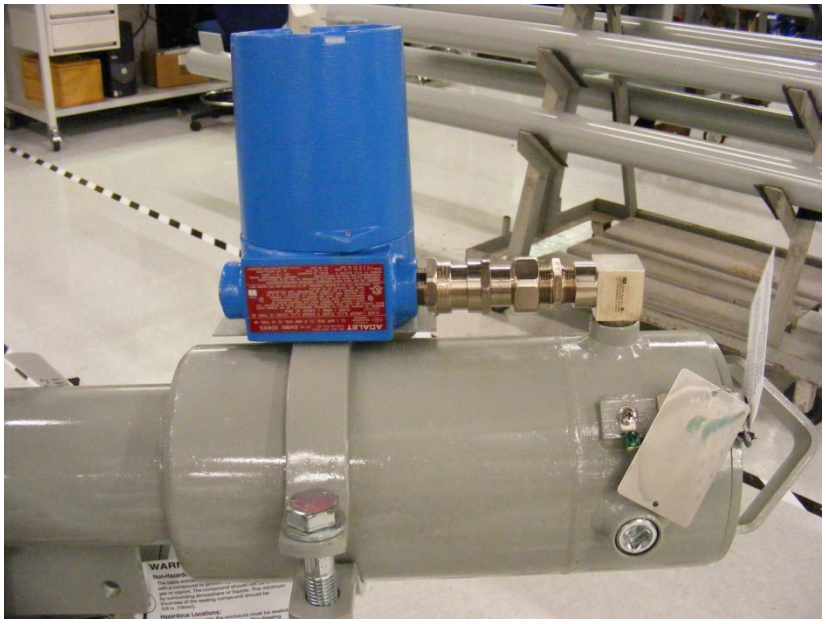

Figure E–4. Completed installation

AC Power Supply Replacement

If this is an AC kit, it will include a new AC power supply that must be installed on the detector. To do this:

1. Remove the detector assembly from the housing, unplug the cable at the bottom of the PCB going to the CPU board and remove the four screws holding the power supply to the detector chassis (shown in Figure E–5).

2. Install the new power supply (p/n 886783) onto the detector chassis, using the four screws removed earlier (shown in Figure E–6).

3. Install the detector back into the housing.

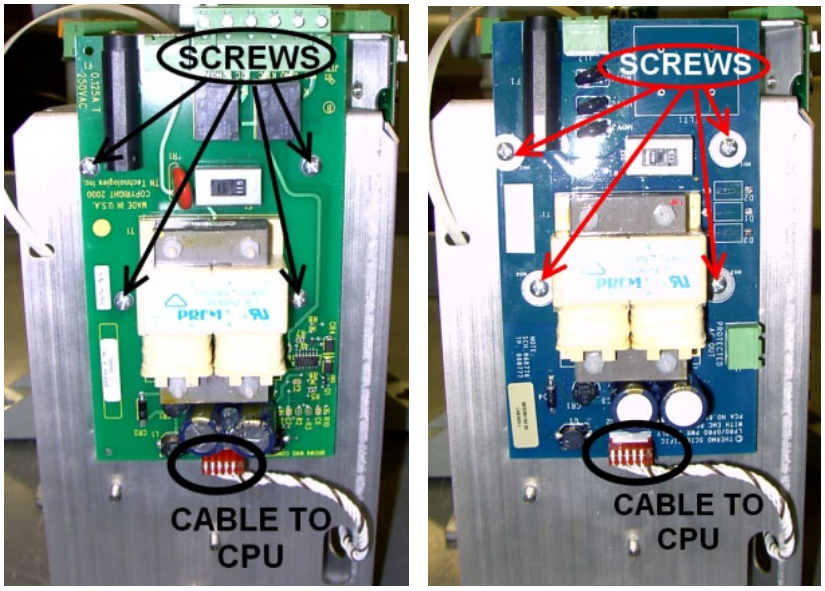

Figure E–5. (left) & Figure E–6. (right)

Wiring

Remove the screw on cover from the EMC protection board housing to expose the EMC board (Figure E–7). Remove the two mounting screws and the EMC board will lift out of the housing.

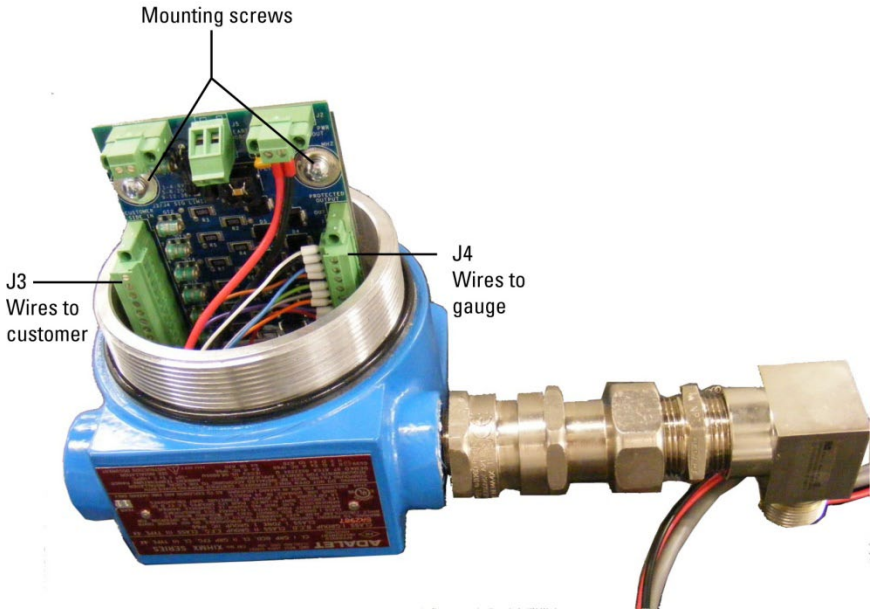

Figure E–7. EMC protection board in the housing

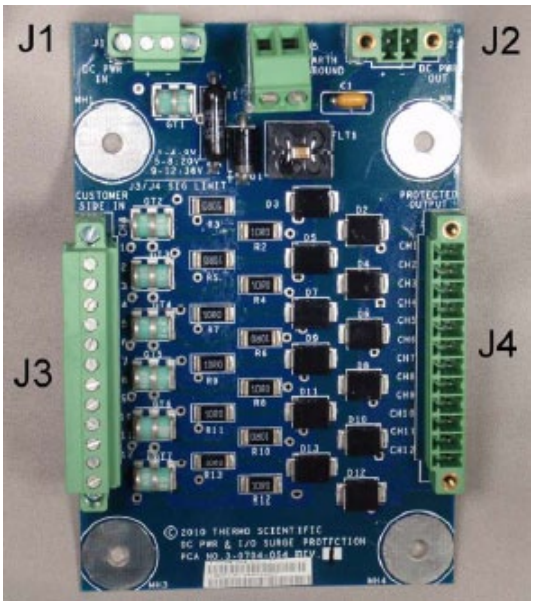

Figure E–8. EMC protection board

The connections shown in Figure E–8 are listed below:

- The connections on the **J4** connector are to be wired to the **detector**.
- The connections on the **J3** connector are to be wired to the **customer's system**.
- **J1** is for **incoming 24 Vdc power**.
- **J2** is for the **filtered 24 Vdc power to go to the detector** (if the detector is DC powered).
- **J5** must be connected to **Earth Ground**.

Warning Do not exceed the voltage limitations of the individual connections or damage will occur to the EMC protection board. ▲

Note There must be less than 1 ohm resistance from the J5 terminal to true earth ground. ▲

The J2 connector has been wired at the factory with two 18 gauge wires, which should only be used only for a 24 Vdc output if the detector is DC powered. The RED wire is for positive side of the 24 Vdc input and the BLACK wire is for the negative side of the 24 Vdc output.

The J4 connector has been wired at the factory with twelve 22 gauge wires, which should be used only for signal wiring such as RS232, RS485, 4–20 mA current output, and 9723 local display. Connections 1 through 4 are limited to 9 Vdc, connections 5 through 8 are limited to 20 Vdc, and connections 9 through 12 are limited to 36 Vdc.

The wiring color code for the factory installed signal cable is as follows:

Table E–1. Wiring color code for connector J4

Terminal	Color	Terminal	Color
1	White	7	Orange
2	Black	8	Purple
3	Blue	9	Red
4	Brown	10	Pink
5	Green	11	Tan
6	Gray	12	Yellow

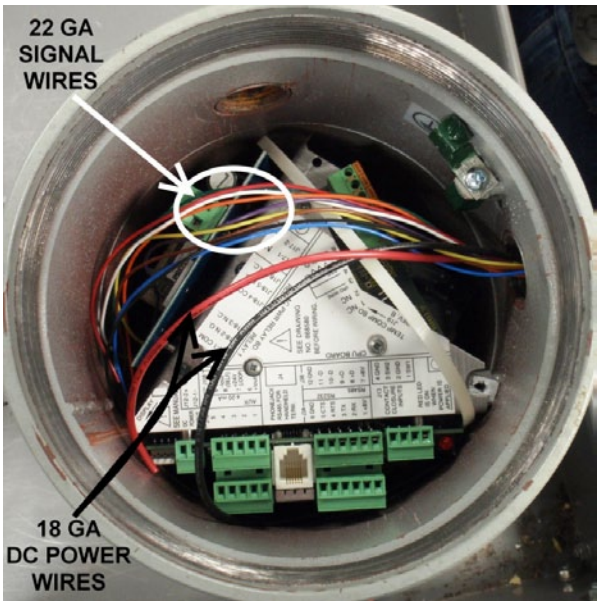

Figure E–9. Detector wires

Note Any wires that are not used should be taped off to avoid shorting out the detector. (It is recommended that you do NOT cut the unused wires, as you may need them in the future.) ▲

Note The above figure shows the wires running into the enclosure. Actual connections are not shown as they will vary. The figure is for reference only. ▲

Due to the voltage limitations of the individual terminals, the RS485, the 9723 local display, the RTD input, and the contact closure inputs can be on any of the 12 terminals. The RS232 can be on terminals 5 through 12, and the 4–20 mA current output and input must be on terminals 9 through 12.

Note If the FOUNDATION fieldbus option has been selected, the fieldbus output must be run on terminals 1 and 2 of J3 and J4 for the fieldbus to operate properly. ▲

Appendix F
Related Technical Bulletins

This appendix lists the technical bulletins related to this product that are available as of the latest release date of this document. For the most current bulletins, please go to thermoscientific.com. Enter the product name (LevelPRO) as the search term and click the Resources tab.

Table F–1. Technical bulletins

TB #	Title
TB-0416-008	Installing the FOUNDATION™ Fieldbus Option on the Thermo Scientific LevelPRO Gauge
TB-0416-012	Replacing the CPU PROM and HART® PROM on the Thermo Scientific LevelPRO Gauge
TB-0416-019	Programming Considerations when Cascading Thermo Scientific LevelPRO Gauges

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Thermo Fisher Scientific
81 Wyman Street
P.O. Box 9046
Waltham, Massachusetts 02454-9046
United States

www.thermofisher.com